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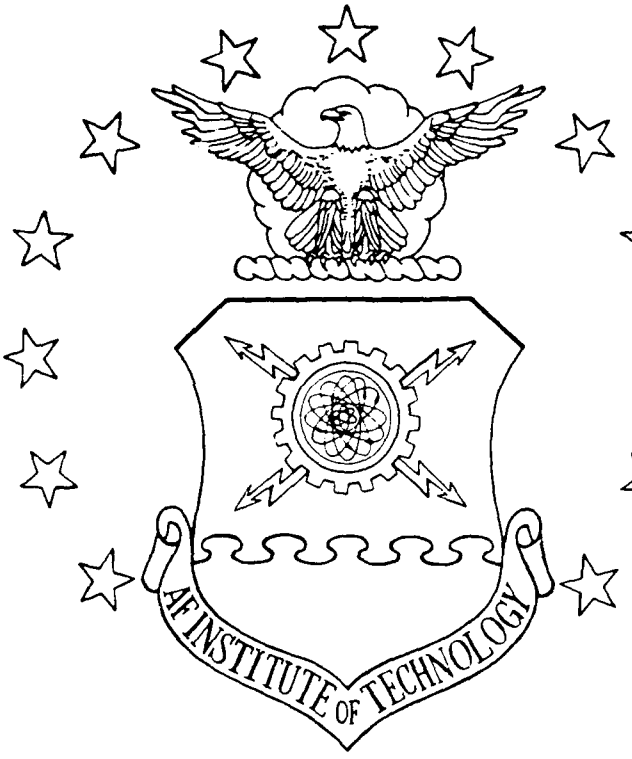

A DETERMINATION OF PERCEIVED COMPUTER LITERACY AND COMPUTER TRAINING NEEDS OI AIR FORCE INSTITUTE OF TECHNOLOGY GRADUATE CLASS 89S/D

THESIS

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AFIT/GSM/LSO/89S-16

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A DETERMINATION OF PERCEIVED COMPUTER LITERACY AND COMPUTER TRAINING NEEDS OF AIR FORCE INSTITUTE OF TECHNOLOGY GRADUATE CLASS 89S/D

THESIS

Presented to the Faculty of the School of Systems and Logistics of the Air Force Institute of Technology Air University In Partial Fulfillment of the Requirements for the Degree of Master of Science in Systems Management

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Preface

This research was intended to provide an understanding of the importance of computer literacy at the Air Force Institute of Technology (AFIT) and identify the computer skills most necessary to students' academic responsibilities. By documenting where AFIT Class 89S/D is now, at the end of their AFIT tour, in terms of required computer skills, this research allows insight into the current computer skill level and training needs of AFIT students. Data was collected from Class 89S/D using a survey. The entire class population, 175 students, were surveyed. Descriptive statistics were analyzed to determine frequency distributions and reach answers to several research questions. The information obtained by this research was provided to the AFIT faculty to help their future computer training efforts. This research was born out of my frustration with learning computer skills necessary at AFIT without the benefit of adequate computer training. My own frustration was fueled by that of my classmates to the point that I considered this research worthwhile. My sincere thanks go to my advisor, Lt Col Richard Peschke, PhD, for directing my frustration towards an end that may assist the AFIT faculty in covering gaps in the computer training AFIT provides. I also wish to thank my biggest supporter, my husband, Scott. His patience, support and encouragement kept me going.

Gay L. Harrison

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Abstract

The purpose of this research was to determine the importance of computer literacy and the computer training needs of AFIT graduate Class 89S/D. Research data was collected through a mail survey conducted during Class 89S/D's fourth quarter of study. Seventy-one percent of the class responded. The information attained from the survey was presented using descriptive statistics. The following three research questions were answered:

(1) Do AFIT graduate students have academic requirements that require computer literacy? If so, how important is having adequate computer skills to student academic assignments? (2) What computer skills are most important for AFIT graduate academic requirements? How knowledgeable do students consider themselves to be in these computer skills? (3) Does AFIT's current level of computer training provide graduate students with sufficient skills to meet academic requirements?

The study found that AFIT students have considerable computer literacy requirements to accomplish academic requirements. Ninety percent of respondents agreed computer literacy was important to ones AFIT success and 52 percent felt they could accomplish assignments better with more computer skills. Microcomputer general skills and the use of word processing and electronic spreadsheet software ranked highest among respondents. In all but two computer areas researched, the respondents considered the computer

terms/concepts to be more important than they rated their knowledge of the area. Specific questions pertaining to the adequacy of computer training at AFIT indicated that an overwhelming percentage, 94 percent, felt their computer orientation training was inadequate. Eighteen percent of respondents felt they had assignments the could not effectively meet due to inadequate computer skills. Respondents indicated that the problem with AFIT computer training had more to do with training quality than the quantity offered.

Recommendations were made to (1) use hands-on training techniques and provide skilled supervision during training, (2) focus training on those areas ranked as most important by the students, and (3) modify current training to narrow existing gaps between areas ranked higher in importance than in student knowledge level.

A DETERMINATION OF PERCEIVED COMPUTER LITERACY AND COMPUTER TRAINING NEEDS OF AIR FORCE INSTITUTE OF TECHNOLOGY GRADUATE CLASS 89S/D

I. Introduction

General Problem

Students arriving at the Air Force Institute of Technology (AFIT) are given an orientation to the computer facilities and systems at AFIT in a four week course, Math 262: "Introduction to Computers at AFIT". This computer orientation course is offered by AFIT to provide students with the necessary background in the AFIT computer environment to allow them to effectively use the available systems during their studies. Some students will also receive additional computer courses during their graduate work to teach specific software applications or programming languages. However, many skills required throughout the AFIT curriculum are never taught outside the computer orientation course. This makes the effectiveness of the orientation course instruction important to a student's computer literacy level. If a necessary computer skill is not covered in the orientation course, students must often rely on self-instruction of some form to master skills not included in any AFIT class material.

Captain David Umphress, an Assistant Professor of Mathematics and Computer Science at AFIT and the Math 262 course organizer for 1988 explained that the orientation course was designed to familiarize students with the AFIT computing facilities specifically. The focus was on introducing students to AFIT systems such as the VAX-11/785 superminicomputer that runs the VMS operating system and AFIT's data communications network, AFITNET. According to Captain Umphress, the course was not intended to teach generic computer skills but rather to familiarize students with the educational computer services at AFIT to allow them to begin using them more effectively (26).

Is the orientation course currently meeting its objective of providing enough instruction to allow students to use AFIT computing facilities effectively? Student critiques of the 1987 and 1988 orientation course have indicated there is a definite need for the course to offer more in the area of generic computer skills (26). Students who enter AFIT without much computer background find it difficult to benefit from an introduction to specific AFIT systems when they do not have adequate computer knowledge to understand the more advanced computer information (21).

On the whole, the computer knowledge level of incoming AFIT students is comparable to that of most incoming graduate students (28). Computer knowledge ranges from the absolute beginner to those with a thorough computer background. Because the AFIT introductory course has only four weeks to

provide orientation to this broad range of student needs, it is imperative that course professors know which students need more help and what computer skills are most important to teach. To provide at least those skills that students must possess for AFIT course work, the orientation course may have to begin on a more basic level for some students than for others to make the most effective use of its limited time. By providing a foundation of knowledge about the computing skills the student will actually need in his/her course work, the orientation course can better prepare students to function in the computer dependent AFIT environment.

Lieutenant Colonel Richard Peschke, Ph.D., Assistant Professor of Logistics Management, is keenly aware of the responsibility AFIT has to produce graduates that will be able to use the computer resources their organizations will be depending on. Lieutenant Colonel Peschke is organizing QMGT 290, the revised computer orientation course Class 90S/D will take in June 1989. He considers an assessment of student computing needs at AFIT to be essential to provide an orientation that will ensure at least a minimum level of competency with the AFIT computing resources (20). According to Lieutenant Colonel Peschke:

> Only through an understanding of what is available, what will be required in each course, and through a development of the necessary skills can each student maximize their educational opportunity. (20).

If AFIT hopes to provide that "maximum educational opportunity" to its students through an effective computer

orientation course, it must analyze student computer needs and design the orientation to meet those needs.

Specific Problem

AFIT students are expected to become familiar with and be able to accomplish basic functions on AFIT computer facilities through the computer orientation course. However, since the course was begun in 1987, course critiques have shown the students do not feel the course is meeting their true computer orientation needs. Summarizing comments made by students after the 1988 course ended, opinions such as: "It was over my head so I did not get anything out of the course;" and "I did not learn the computer skills I needed to handle my class work;" were the norm (25).

Major Thomas Triscari, Jr., Ph.D., Associate Professor of Systems Management, is the program manager for AFIT students earning a graduate degree in Systems Management which requires substantial computing skills. Major Triscari's analysis of the problem with the orientation course is that it did not start at the beginning when teaching AFIT computer systems. "The course needed to get students comfortable with getting on and off each system and then move into introducing application software that the students would be dealing with in classes," Major Triscari concludes (25). Because the course did not do this, students were not comfortable with the personal computer operating system, MS-DOS, that the school provides for their class requirements (25).

Instructors who depend on the orientation course to prepare students to handle their course assignments are also dissatisfied with the computer training provided the incoming students. Professor Daniel Reynolds, an instructor of managerial statistics where considerable computer work is requested of the students, commented that the orientation course was "...disastrous, seeming to have taught no basic skills needed for course work" (21). Because students came into Professor Reynold's courses with inadequate computer familiarity, he was forced to spend extensive time teaching various mainframe and personal computer skills as well as introducing application software such as spreadsheets. Professor Reynolds has no doubt that much of the struggle students went through in his classes was due to an inadequate introduction to not only AFIT systems but also to rudimentary computer skills in the orientation course (21).

All of this points to a need to scrutinize the computer training offered at AFIT to determine if it is meeting the computer education needs of the students. A clear understanding of what skills the students actually need is necessary to structure a course that will address these needs within the limited time the course has.

The new orientation course, QMGT 290, is being developed in an effort to offer more specific instruction to the students. In 1989, Math 262 will still be the course given to AFIT Engineering School students but the new course, QMGT 290, will be developed to teach students of the AFIT School of

Systems and Logistics. To guide QMGT 290's development and future course modifications, this research will determine what computer skills an AFIT student needs. An AFIT student's computer needs, as used in this study, will be defined as those computer skills necessary for accomplishing the computing requirements placed on AFIT students for course work.

Research Objective

The research objective of this thesis is to document the computer skills required of an AFIT student, to determine the relative importance of these required skills to AFIT's academic requirements and to identify training problem areas. By analyzing a needs assessment this research will identify where the AFIT student now ranks himself/herself in terms of computer literacy and where the student perceives he/she needs to be. The ultimate goal of this research is to assist AFIT faculty in planning appropriate computer training. Bridging the gap between "what is" and "what should be" is best begun by identifying needs (14:5). Roger Kaufman illustrates how to conduct this needs assessment by listing three characteristics such a discrepancy analysis must have:

1. The data collected must represent the world of the AFIT student as it actually exists now, as well as how it could and should exist in the future.

2. We must realize that no needs determination is final and complete but is actually tentative. The validity of our assessment of student computer literacy needs analysis should therefore constantly be reevaluated.

3. The discrepancies of this research should be identified in terms of end products required and not in terms of means to reach those end products (14:29).

Kaufman stresses that a needs assessment will identify gaps between where AFIT student computer literacy is and where students want it to be but will not identify the ways to close that gap (14:29). This research provides a picture of what, if any, computer needs gaps exist at AFIT to support the follow-on efforts of faculty working to close this gap.

Research Questions

This research is designed to answer the following research questions:

1. Do AFIT graduate students have academic requirements that require computer literacy? If so, how important is having adequate computer skills to student academic assignments?

2. What computer skills are most important for AFIT graduate academic requirements? How knowledgeable do students consider themselves to be in these computer skills?

3. Does AFIT's current level of computer training provide graduate students with sufficient skills to meet academic requirements?

This research will build upon the survey findings of Captain Richard Lenz, AFIT Class 88S. Captain Lenz compiled research on the computer skills possessed by AFIT Class 89S/D

prior to arriving at AFIT. QMGT 290 should be developed and based on input from these two surveys, one telling student skill level upon arrival at the orientation course, and this research's survey which clarifies what skills the students feel need to be taught for graduate work requirements.

Scope of the Problem

This research is limited to survey information gathered from graduate students of Class 89S/D of the AFIT School of Systems and Logistics. As the introductory computer course will be taught separately from here on to Engineering School students and Logistics School students, I will not include Engineering School student inputs and will focus solely on the needs that should shape the course offered to Logistics School students.

All students of Class 89S/D were surveyed and their responses were analyzed using descriptive statistics. This data provides a picture of Class 89S/D that can be used to understand current computing needs at AFIT. It is not intended to represent past or future class needs though reasonable similarities can be assumed.

Organization of Thesis

Chapter I of this research includes an introduction to the study, a statement of the specific problem and research objective, and a discussion of the scope of the problem analysis. Chapter II includes a review of the literature

pertinent to this study. Background information on computing requirements at AFIT as well as the subject of computer training in general are covered. Chapter III outlines the research methodology used for this study. Chapter IV contains analyses of the data collected from the survey and Chapter V summarizes the data analysis by listing conclusions and recommendations directed by the data.

This thesis is constructed in accordance with the model provided in AFIT's Style Guide for Theses and Dissertations.

II. Background

Introduction

The purpose of this literature review is to present current available literature dealing with areas important to this thesis project. The literature presented covers: the importance of computers to the military and federal government as a whole, the use of computers at AFIT, problems in training microcomputer users, and some suggested solutions to these training problems.

Scope of Research Topic and Data Base

This research focuses on microcomputer training for beginning students especially. Specifically concerned with problems teaching basic computer literacy, this research covers first-introduction training and problems that training must overcome. Basic computer literacy, further defined in this section, means possessing fundamental operating system, word processing and spreadsheet operating skills. Research gathered was selected for applicability to Air Force computing needs. The data bases used to obtain research materials for this research were: Reader's Guide to Periodical Literature, and the Defense Technical Information Center Technical Report Summaries. The sources cited in this review are professional journals dating from March 1985 through July 1988, books, published theses, and comments from interviewed AFIT faculty.

Method of Treatment and Organization

This literature review first deals with materials covering the importance of microcomputer technology and then present literature identifying the training problems that must be dealt with to maximize computer effectiveness. Training problems and suggested solutions are categorized as either learner anxiety problems or training technique problems.

Definitions

Some key terms used throughout this literature review merit introduction. These terms and their explanations are listed below.

Microcomputer: A very small computer containing a microprocessor and supporting devices such as a memory system; also referred to as a personal computer or PC (27:897).

Software: Programs, data and routines a computer uses (not the physical components of the machine) (27:1353).

Computer Literacy: (In this research) The ability to employ operating systems, word processors and spread sheet programs, run job-specific software and effectively apply these operations to job requirements.

Network: Interconnected computers capable of sharing data.

Floppy Disk: A magnetic disk used to store data and software.

Menu Driven Program: A program that uses a screen of directions (the menu) to guide the user vice a command driven program where the user must memorize appropriate commands to run the program.

Spreadsheet: A common type of computer software program, basically an electronic accountant's ledger book.

Word Processing: text manipulation using special software.

Need for Computer Training

The Air Force is steadily increasing its dependance on microcomputers. Many personnel now work in offices where they are expected to use newly purchased computers, but many of these personnel never receive the training necessary to become effective users of the new equipment. Personal experience indicated there was a serious training deficiency in the area of microcomputers and an initial review of published materials substantiated that there was little literature existing on training programs geared for orienting new computer users.

This problem has been shown to exist at the Air Force Institute of Technology (AFIT) where the course designed to orient students to the educational computing systems they will be required to use has received poor critiques by students and instructors alike. As the first extensive experience many students have with computers, the AFIT orientation course serves the vital function of starting students down the right path towards computer literacy. Computer work students undertake throughout their AFIT tour will build upon skills learned in the orientation course and, hopefully, will result in a computer literate AFIT graduate. According to experienced Air Force supervisors such as Lieutenant Colonel Frederick Westfall, Ph.D., Assistant

Professor of Logistics Management at AFIT, becoming computer literate is essential to AFIT graduates because the superiors they will work for upon graduation expect computer literacy from AFIT graduates. An AFIT graduate is expected to be on the forefront of integrating effective computer operations into all areas of the Air Force (28).

If the Air Force is to fully realize the potential of its microcomputers, it is essential to have personnel who are able to use the equipment to its capacity. In an interview with Government Executive (May, 1986), Lt. General Emmett Paige, Jr., then Commander of the Army Information Systems Command, was cited as saying: "You can reorganize and pour all the dollars you want into buying computers, but if you don't train the workforce, you're wasting your money..." (18:9). The same goes for the Air Force; indeed, for all agencies trying to benefit from microcomputer technology. The importance of computer literacy in the Air Force supports this search and review into problems inherent to computer training and solutions to these problems.

The Air Force commitment to computer use is well established. In his article from Air Force Magazine, Major General James Cassity, Jr., then Commander of Air Force Communications Command (AFCC), discusses Air Force computer reliance and the need for networking.

> The average Air Force base depends on about ninety different computer-based systems...AFCC recently released a multibillion-dollar proposal request to procure standard, multiuser small computers for the Air Force and the rest of DoD. It has been specified these computers

> must feature an operating system which will allow portability in application software. AFCC works to meet the needs of an increasingly computer literate military force. The Desktop III procurement program plans to buy an estimated 250,000 state-of-the-art minicomputers DoD-wide. The Desktop III contract, with an estimated value of more than $1 billion, should be awarded in 1989. (6:64-67)

General Cassity emphasizes the critical reliance the Air Force places on computers discussing future investments the Air Force will make in computer technology. He elaborates on the need for careful system planning as microcomputer systems become more prolific and Air Force users more computer sophisticated. In Government Executive, the need for standardization of software to ensure compatibility is addressed. The article by Jeffery Baltimore, Vice President of a microcomputer sales and consulting services firm that holds contracts with several federal agencies, focuses on agency-wide standardization

(2:35). According to Baltimore:

> The U.S. Federal Government is the world's largest single purchaser of Automatic Data Processing products. The ability to have each word processing, database management, and spreadsheet package conform to the same file and command format is imperative to an agency with a high staff turnover rate. Additionally, any information electronically transferred between agency locations and offices can be readily used after transmission, eliminating the costly and time-consuming conversion processes needed when unlike software applications are used. Since hardware technology advances at a rapid pace, it is vital to maintain a software standard throughout the agency. (2:35)

Cassity and Baltimore agree that the Federal Government's computer investment must be followed by a commitment to standardizing the systems. Baltimore stresses that overall

standardization will create an enhanced atmosphere for training and subsequent implementation throughout the Federal Government. Benefits will come in the form of cost effectiveness, efficiency, stability, long term growth, functionality and minimization of duplicated efforts (2:35).

Cassity referred to the U.S. military force as "increasingly computer literate" (6:67); however, many workers have had no formal computer training and either struggle to gain the needed computer skills on their own or resist learning the new technology. According to Air Force computer scientist Colonel Robert Hedges, in a Signal article, the entire DoD faces a dilemma (3:51). Hedges states: "We can't operate without computers, we can't go back to our old manual methods of operation, and we can't seem to apply new computer technologies successfully to our own satisfaction and that of Congress, the General Accounting Office, and other external critics." (3:51) Training is needed to enable those who have not had any initial computer exposure or have limited computer skills to become the computer literate force the Air Force needs. Unfortunately, there are numerous obstacles to introducing someone to computers.

Computer Training Problems

At least two major obstacles must be overcome to effectively train a first-time or very inexperienced computer user. First, any anxiety the student has towards computers

must be defused, and then the style of instruction must be designed to enable the most productive learning to occur.

Computer Anxiety. In the journal Perspectives in Computing, Kittredge Cary Cowlishaw explains the computer climate he found while a Visiting Fellow in Information Technology to Oxford University in October 1985. His goal at Oxford was to overcome the anxiety and even hostility many of the students felt toward computers (8:16). Cowlishaw discovered that the number of people who were not comfortable with computers was not insignificant and he developed a course to remedy that situation. Called "Computing for the Terrified", his course set about to bridge the gap that existed between total ignorance of computers and the skills covered in the standard computing courses (8:16). The same situation existed at Oxford that now exists in the Air Force. No training was available for the person so bewildered by computers they could not benefit from standard training programs where some prior knowledge of computers is assumed. Often students had to take the burden of self-teaching, relying on manuals, that a person with no basic skills can not handle.

The way Cowlishaw dealt with his bewildered computer students was to begin at the very basics. He cleared up all questions, some as elementary as "What is a floppy disk?" to "How does a document get from the screen to the printer?", by answering everything in plain English. Cowlishaw then proceeded to step the students through basic skills

exercises (8:18). In the end, students who previously feared even touching a keyboard, believing they would "blow-up" the computer, were able to accomplish basic word processing, spreadsheet, and operating system organization tasks (8:19). Cowlishaw's training approach could be as effective in the Air Force in general and at AFIT specifically as it was at Oxford. Without an elaborate procedure, nothing more than covering the basics and demonstrating them on a level manageable to the inexperienced computer user, Cowlishaw's training got beginners over the computer literacy "hump".

G. Bracey also addressed the problem of computer anxiety in his article for PHI DELTA KAPPAN. Bracey writes that in his experience students often "catch" anxiety from teachers (4:527). Bracey's assessment is that often teachers do not have computer skills mastered themselves, or feel unable to handle out of the ordinary situations that students of computers often get into while learning. If a nervous teacher transmits that lack of confidence the effect on the student can be increased anxiety and a less effective learning environment. Bracey concludes that the way to avoid teacher-induced anxiety is to allow the teachers enough exposure to computers to resolve their own anxiety (4:528).

The importance of having a competent teacher to have a successful computer training course was also stressed by AFIT Associate Professor Major Thomas Triscari, Ph.D. Major Triscari pointed out that the computer orientation course AFIT offered would only be as good as the instructors teaching it.

By this he specifically meant the instructors' abilities to relate the computer information in non-threatening, layman terminology would determine the quality of student learning (25). Just having computer knowledge is not enough for the computer orientation course instructor; the ability to communicate that knowledge to students is also vital.

Not all computer illiterates display anxiety towards learning computer skills, but even a slight resistance will affect how and if they learn. Computer training programs must be geared to successfully teach students with varying levels of computer knowledge and anxiety.

Style of Computer Instruction. Computer training programs that depend on the student already having basic skills and those that are completely computer taught, such as a menu driven program where a student inserts a disk and follows directions given on the screen, often do not meet the needs of the beginner. The unique needs of the beginner, especially if that beginner has anxieties about computers, makes at least some human instruction preferable. Literature reviewed for this topic was meant to deal specifically with the needs of the beginner and persons only marginally comfortable with his/her computing skills. Training programs dependant on a student having significant prior computer skills were not included in the review. AFIT students of graduate Class 89S/D can reasonably be grouped into the beginner to intermediate category based upon the knowledge levels indicated by research conducted by Captain Richard

Lenz. According to this research, addressed more completely later, over 60 percent of students in Class 89S/D rated their overall microcomputer skills as marginal to poor (15:108-109).

One article reviewed dealt with augmenting software training by accompanying that training with the best software workbook possible. In their article for Signal, John Finn and Joseph Bock discuss the military computer dilemma:

> The use of microprocessors as embedded components in weapon systems and the pervasive use of computers in training and operational environments has highlighted the necessity of service wide computer literacy. According to one estimate, the DoD will increase expenditures on computer hardware and software from $4.1 billion in 1980 to $38 billion in 1990. ...None the less, learning to use seemingly hostile machines is a difficult, often frustrating, experience. One of the difficulties in getting to the literate stage is that, despite the creation, purchase and deployment of many excellent software packages, the user's manuals are often as difficult to get through as thick fog. (3:51)

The Signal article goes on to detail the authors' experience with developing a workbook capable of clear explanation to the new computer user. The workbook was developed to accompany instructor led training of officers at the U.S. Army Command and General Staff College. A minimalist design was followed based on over 1,000 hours observing software users that showed:

> ...less, not more, explanation in user manuals is needed. ...Users often feel overwhelmed by software manuals, thus making the learning process frustrating and inefficient. After developing a manual covering only basic operations with minimum guidance and explanation, the preliminary evaluation is encouraging. It suggests an "over the hill" benefit to the approach: Once users learn the basics, they subsequently rapidly learn advanced applications. (3:51)

The article gives hints and warnings to consider when developing a workbook and concludes emphasizing that "an initial positive experience with computers is perhaps one important step toward widespread computer literacy within the U.S. Army" (3:62). Echoing this same philosophy, Lieutenant Colonel Dorothy McBride, Ph.D., noticed the negative effect the bad experience in their computer orientation course left with some students. Lieutenant Colonel McBride recognized that a bad initial experience with computers in the orientation course increased computer anxiety in some students and acted as a turn-off to computers overall (16). Whether accomplished by means of a well written user manuals of other methods of instruction, it is clear that ensuring the first exposure students have to computers is a positive one is a way to encourage them to advance their knowledge and achieve literacy.

One must be cautioned about jumping at improved instruction manuals as the sole solution to computer training challenges. A problem commercial businesses are seeing, one that the Air Force shares, is identified in Working Woman by John Stoltenberg.

> In a survey of 200 women in small businesses, Working Woman found that...the problem of training staff was a major concern. One out of three of the businesses surveyed reported trouble with getting the proper training. And one in five were worried about their staff's ability to run a computer. **Rarely will an instruction manual solve these problems** (emphasis added). (24:63)

Stoltenberg recognized that some type of personal interface instruction is needed to augment a training manual. Aside from educational equipment needed to train, there is a need for human training skills. The article explains techniques of training used by businesses specializing in "peopleware" instruction - training by human beings (24:63). These businesses train everyone from the computer-anxious individual to the moderately skilled by providing hands-on classes that are supported by human instruction rather than depending on computer assisted instruction alone. Getting the computer-leery person comfortable attacks the problem of workers shunning the computer and limiting the benefit each business gets from its computers (24:64). Just as Cowlishaw did at Oxford, Stoltenberg comes to the conclusion that basic instruction in simple english is the key to creating computer literacy. The belief that once an individual feels comfortable with the basics, they will continue learning and master the more complicated skills is the main point of the article from Perspectives in Computing by Mark Shields. Shields conducted a university-wide survey of Brown University students in support of research to collect data on how members of the Brown community respond to a changing, computer-intensive environment (23:57). A key finding was that as students became more active computer users, they also tended to become more enthusiastic towards the computer. Familiarity with the computer led to contentment (23:57).

Encouraging their personnel to become computer literate and continuously improve their computer skills is a concern of the Air Force as a whole. The need for microcomputers and personnel to operate them increases with each microcomputer purchase the Air Force makes. The billions of dollars the Air Force has invested and is planning to invest in computer technology makes it essential that the military work force be prepared to use computers effectively or the Air Force's money will have been wasted.

Computers at AFIT

Captain Richard Lenz conducted a survey in 1988 of AFIT 1989 class (Class 89S/D). The survey was done prior to the students' arrival at AFIT and collected data on their level of computer competence upon entering AFIT. The results of his research provide valuable information as to the composition, preferences and knowledge levels with regards to computers of Class 89S/D. Building upon the information Lenz gathered on Class 89S/D will allow more informed analysis of the research gathered from this research.

Some key facts surfaced after Captain Lenz' research. One fact he discovered was that AFIT is not yet matriculating students with a strong formal background in personal computer use. Mainframe computer knowledge seems more prominent (15:74). One of the hypothesis Lenz tested led him to conclude that there was no apparent difference between program options in the level of PC knowledge students entered AFIT

with (15:74). This leads to the awareness that, if computer needs differ between program options, but the level of incoming computer knowledge is basically the same across options, it will be necessary for AFIT to know how computer needs vary between program options to offer each student what his program option requires. Captain Lenz also determined that class mean college graduate dates took a jump of two years between Class 88S/D (graduate mean date of 1980) and Class 89S/D (graduate mean date of 1982) (15:75). Because major colleges and universities have just begun emphasizing personal computer use on campus within the last six years, it could feasibly be two to three classes into the future before incoming AFIT students begin to show significant increases in personal computer knowledge (15:75). In the meantime, AFIT must depend on their orientation course to provide the foundation students need to successfully meet graduate requirements.

According to Captain Lenz' findings, the majority of students coming into Class 89S/D rated their computer skills low in several key abilities. Of the 141 surveys sent out to Class 89S/D, 119 were returned. On a scale of available responses: "excellent", "good", "only fair", "poor" and "terrible", 66 percent of respondents ranked their personal computer (PC) and MS-DOS skills as being "only fair" to "terrible". Incoming mainframe skills scored even lower with 94 percent of respondents ranking themselves in the lowest three rankings. Students had higher incoming skills using

word processing programs, but 44 percent still rated themselves in the "only fair" to "terrible" range. When asked to rate their spreadsheet abilities, 73 percent of Class 89S/D rated themselves in the low range (15,108-109). Lenz found that although over 88 percent of the incoming respondents had used a personal computer, a very large number, 71 percent, were using a PC less than one hour per day (15,30-32).

Lenz' picture of the incoming classes' computer experience does not support the orientation course's omission of some instruction of computer basics. With such high percentages of students rating their skills so poorly it would not be backtracking on much previous knowledge to teach the basics of PC operations and widely used software packages, word processing to a small degree, and spreadsheets to a larger degree.

One of AFIT's main roles as a graduate institute is to prepare its students to maximize the productivity of their office after graduation (28). With the proliferation of microcomputers a graduate will face, it is essential AFIT start its students down the road to computer literacy. Computer literacy will be defined throughout this research as having the ability to function adequately in whatever computer capacity required by an individual's specific environment (29:8).

An understanding of the capacity in which an individual will use computers is key when determining the skills that individual needs to be taught. A student's needs must be

clearly and adequately defined, and be sufficiently important to warrant the expenditure of resources such as teaching manhours, to meet the needs (17:32). According to research author Benjamin Ostrofsky:

> Needs analysis provides the justification for proceeding with the expenditure of resources such as time and effort. It forms the keystone on which the entire subsequent decision structure must be built. (17:31)

AFIT must ascertain exactly what computer skills its students need to know in order to allocate the limited resources of time and instructor attention most effectively in meeting the student needs.

Summary

AFIT can further the goal of computer literacy in the Air Force by producing graduates who are computer literate and ready to spread their knowledge. The computer orientation course this research will focus on plays a key role in directing AFIT students towards computer literacy. This section of reviewed literature has presented views on the importance of computer technology and the conclusion is the same from all sources, the technology is vital, it will continue to increase in importance and complexity, and the huge dollar investment and operational dependence of agencies using this technology will only be profitable with a computer literate work force.

In analyzing how to build a computer literate work force, this literature has pointed out the importance of considering

the anxieties of new computer users. By structuring programs that are sensitive to learning blocks such as computer fear and resistance to computer education, one can overcome the barriers and provide the basic skills students need to continue in computer skill learning. The merit of human interface teaching supported by a well written workbook was identified.

The belief that once a new computer user had been taught the most basic skills that student would continue on with his learning and achieve computer literacy was key. For the Air Force to gain the most from its computer technology investment it must make available the training necessary to start its workers down the path to computer literacy.

III. Methodology

Method Justification

A mail survey was used to collect data for this research. The methods available were telephone surveys, personal interviews and the mail survey. A survey instrument was chosen because surveys are basically efficient and economical (10:158). Collecting information based on opinions and attitudes, such as this research, is the great strength of survey questioning (10:158).

Because of the large number of participants involved in the research, the telephone survey and personal interview methods were considered too time intensive. Using a mail survey, the data could be gathered more efficiently.

Another reason to select the mail survey method was to maximize the number of participants who would allocate time in their busy academic schedule to complete the survey. The weakness of using a survey materializes if response rates are poor or respondents do not cooperate and correctly fill out the survey (10:159). It was assumed that a mail survey would encourage higher response rates by allowing participants to choose when to fit the survey into their schedule. Allowing ample time for respondents to answer and following up on delinquent surveys were other techniques available to help secure a higher response rate.

Using the mail survey also allowed the data to be collected more anonymously than the other methods (10:172). This factor was deemed important to avoid biasing the results. It appeared probable that participants who feared retribution for their responses or for any other reason may have been reluctant to answer honestly could be best reassured by an anonymous survey.

A final reason the mail survey was chosen for this research was that, as future classes undergo curriculum changes that change computer skill needs, this survey could be re-administered. A survey is an easy medium for repeatedly collecting the same data on different groups.

Measurement Instrument

The survey was constructed with the objective of assessing the computer needs of AFIT students as perceived by the students. Survey results were grouped according to the program option of the respondent. Most results were analyzed by looking at the class as a whole, but comparisons among program options were also made where appropriate to the research's objective. This analysis answers the research questions below.

1. Do AFIT graduate students have academic requirements that require computer literacy? If so, how important is having adequate computer skills to student academic assignments?

2. What computer skills are most important for AFIT graduate academic requirements? How knowledgeable do students consider themselves to be in these computer skills?

3. Does AFIT's current level of computer training provide graduate students with sufficient skills to meet academic requirements?

These research questions were addressed by analyzing frequency distributions of responses. Conclusions have been made as to the key needs of Class 89S/D and, where applicable, of each program option. This information can be used by faculty designing future computer orientation courses to allow them to make the most effective use of very limited resources by teaching exactly what the students need to know for their graduate work.

Survey Design

Techniques described by Don Dillman's text on survey construction were followed to determine questions that would provide the type of data desired (9:80-112). A computer needs survey of Air Force Administration Officers, previously tested in research by Captain Cheryl Coleman, was used to guide survey construction (7:91-97). Questions pertaining to determining preferred learning styles were drawn from published dissertation research conducted by Dennis E.

Campbell, Ph.D. in 1986 (5:47). The survey also was reviewed by a panel of experts prior to administration.

AFIT graduate programs run either five or six quarters. The students answered the survey during their fourth quarter. This brought in the question of whether, with one or two semesters still to go, the students could know all the computer skills their program would require. A thorough review of the courses each program option required and interviews with each program option's manager supported the conclusion that each option's students would be introduced to all the computer skills they would require throughout their program by their fourth quarter (16; 11; 25; 13; 28; 22).

The survey instrument consisted seven parts, six parts contained multiple choice and scale rated questions and one part consisted of an open-ended question to address any concerns not covered in previous sections. The survey was administered in written format, with each participant asked to respond on computer code sheets provided. The returned answer sheets were optically scored by mainframe computer and the essay responses were hand registered. The survey instrument is displayed as Appendix A in this thesis.

In Part I, the survey asked a multiple choice question designed to determine the student's program option. Respondents were asked to place themselves in one of six program option categories. The categories were: Graduate Cost Analysis (GCA), Graduate Contracting Management (GCM) Graduate Engineering Management (GEM), Graduate Information

Resource Management (GIR), Graduate Logistics Management (GLM) and Graduate Systems Management (GSM). The GLM option was consolidated to contain the program options that fall within the Logistics Management Program: Graduate Inventory Management (GIM), Graduate Acquisition Management (GAL), and Graduate Transportation Management.

Part II questions then asked participants to select their preferred instruction technique from a list. This section was guided by the belief that, by matching students' preferred learning strategies to the teaching strategies used, students will feel comfortable and learning will be enhanced (5:47). Part II responses were combined with additional learning preference questions from Part VI where participants answered using a Likert-type scale. The learning preference data was obtained to support recommendations for any training changes this research might point out.

A Likert-type scale was also used to rate participants' opinions about microcomputers at AFIT in Part III, and to rank a list of computer terms and concepts according to student knowledge level and perceived importance in Parts IV and V. The data collected was used to answer the research questions of this thesis.

Validation. Both external and internal validity were monitored. Research findings have external validity if they can be generalized across persons, settings, and times (10:94). Data collection for this research was on the entire population, which could provide information complete enough so

as to have almost perfect external validity. Seventy-two percent of the surveyed population responded, providing an excellent response rate compared to the 25 percent response rate typical of mail surveys (19:392). Realistically, because 27.6 percent of the population did not respond, the actual amount of data collected was a large sample. In this case, the 71.4 percent response rate is large enough to minimize data extrapolating and should allow generalizations based on the data to be highly accurate.

Internal validity, "the ability of a research instrument to measure what it is purported to measure" (10:94) consists of two major forms in this research: content and construct validity. Content validity is concerned with ensuring the measuring instrument provides adequate coverage of the topic under study (10:95). The subjective decision about whether the survey adequately covers the target topic was determined by my thesis advisor and several faculty members recommended by him for an expert panel. Inputs made by my advisor and the review panel were incorporated into the survey and the survey was resubmitted to the reviewers. This process continued until the advising group considered content validity to be high.

Construct validity is concerned with how accurately the measurement tool measures what we intend it to measure (10:97). To strengthen construct validity the survey instrument was developed with the guidance of questionnaire construction manuals and previously tested surveys.

Sensitivity to wording and phrase meanings was emphasized in an effort to reduce bias in the survey.

Sample/Population

The entire AFIT graduate Class 89S/D was surveyed for this research. The class is comprised of 175 graduate students. A comparison of the number of students in each program option and the number of students in that program option that responded is represented by Figure 1.

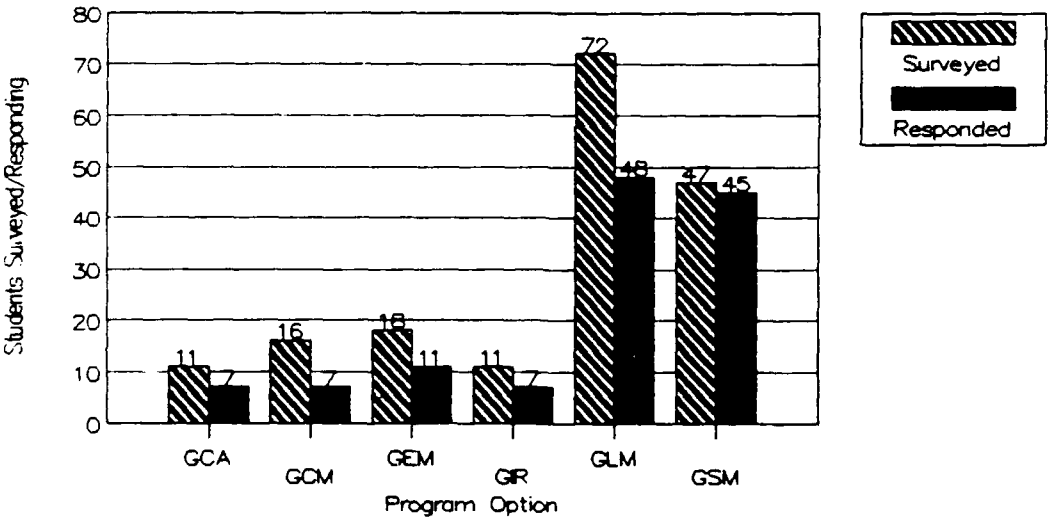

Figure 1. Comparison of Population Surveyed to Population Responding

Figure 1 shows that each program option had a strong response rate. Numerically, the percentages of each program option responding was as follows:

GCA: 7 out of 11 students, 63.6 percent, responded,

GCM: 7 out of 16 students responded, 43.7 percent,

GEM: 11 out of 18 students responded, 61.1 percent,

GIR: 7 out of 11 students responded, 63.6 percent,

GLM: 48 out of 72 students responded, 66.7 percent, and

GSM: 45 out of 47 students responded, 95.7 percent.

The total response rate was 125 out of 175 students responding for a return rate of 71.4 percent. The response rate was well over a majority representation of the class and only one program option, the GCMs, had a response rate below 60 percent.

Details of Data Collection

The survey package was placed in the student mail boxes at AFIT on 3 May 1989. The last return was accepted on 31 May 1989 and at that time 125 usable returns had been received. To encourage a high response rate an electronic mail message over AFIT's communication network known as AFITNET was sent to the class after the surveys had been out for 12 days. In addition, several persons contacted me via electronic mail to request replacement packages for lost surveys or ask questions concerning the survey. Having the electronic mail path open to the researcher seemed to encourage a higher response rate.

IV. Analysis of Survey Responses

Introduction

The survey used in this research was designed to determine the perceived importance of computer skills to accomplish AFIT academic requirements, and to identify specific areas of training AFIT students perceive as deficient. A survey was determined to be the most appropriate method of collecting data and every member of AFIT Class 89S/D was surveyed in May 1989. Chapter IV analyses the data collected from the class.

The response analysis is grouped in order following the seven sections of the survey except for sections two and six. These sections both deal with learning preferences and are therefore grouped together. The survey sections are analyzed by: academic background, instruction/learning preference, opinions about computer use/training, knowledge of computer terms, importance of computer terms, and an open-ended question. The most significant response data is reported in tables of the response percentages. Complete data responses are listed in Appendix C.

Academic Background

Table I shows the composition of AFIT Class 89S/D by academic program option. Both the total number in each program option and the number actually responding to the

survey are charted. The response rate for the class was 71.4 percent with 125 out of 175 possible responding. The lowest program option response rate, and the only one under 60 percent was the GCM option with 7 out of 16 students responding for a 43.7 percent response.

Table I

Academic Background

Question #1: In what AFIT graduate program are you enrolled? Response	Population	Frequency	Percent
GCA	11	7	63.6
GCM	16	7	43.7
GEM	18	11	61.1
GIR	11	7	63.6
GLM	72	48	66.7
GSM	47	45	95.7
CLASS 89S/D	175	125	71.4

Instruction/Learning Preference

Part II and part VI were designed to determine student learning preferences to make recommendations for future computer training course design. In Part II, questions 2 through 6 asked the respondent to select from a table those learning techniques he/she found most enjoyable. Questions 7 through 11 asked for a ranking of those techniques the respondent considered the least enjoyable. Tables II and III chart the best and worst preference responses. The frequency distributions are shown in their entirety in Appendix C.

Table II

MOST Enjoyable Learning Method, Technique, and Device

Question #2 Responses

Ranking	Selection	Frequency	Percentage
First	Lecture/Instructor Demo.	28	22.4
	Discuss with instructor	21	16.8
	Group Projects/Discussion	18	14.4
	Confer with/observe students	11	8.8
	Computer-assisted instruction	10	8.0
	Exercises/Worksheets/Homework	10	8.0
	Laboratory	9	7.2
	Reading	6	4.8
	Peer Teaching	4	3.2
	Films/Videotapes	4	3.2
	Flipcharts/Vu-graphs	3	2.4
	Pop Quiz	1	.8
		125	100

Table III

LEAST Enjoyed Learning Method, Technique and Device

Question #7 Responses

Ranking	Selection	Frequency	Percentage
Worst	Pop Quiz	34	27.4
	Peer Teaching	24	19.4
	Drill and repetition/Memorize	20	16.1
	Examinations	15	12.1
	Computer-assisted Instruction	8	6.5
	Group projects/discussion	5	4.0
	Lecture/Instructor Demo.	4	3.2
	Films/Videotapes	4	3.2
	Reading	4	3.2
	Laboratory	3	2.4
	Confer with/observe students	1	.8
	Discuss with instructor	1	.8
	Flipcharts/Vu-graphs	1	.8
		124*	100

*one response was missing

Tables II and III indicate a class preference for instruction which allows consultation with others, either the instructor or a group of students. Methods such as pop quizzes, drill and repetition/memorization, and examinations top the list of least preferred instruction methods. This ranking supports the conclusion that the students prefer group and open discussion types of instruction over methods that require a student to work alone. The high ranking of peer teaching as a worst technique may indicate a preference for highly skilled instruction. This is supported by the most preferred ranking (22.4 percent) of instruction by lecture/instructor demonstration.

In part VI, questions 64 through 71 asked respondents to answer based on a continuous scale where A= strongly disagree, B= disagree, C= neither agree nor disagree (neutral), D= agree, and E= strongly agree. Again, the most significant findings to this research are listed in the following tables and discussion. The frequency distributions are shown in Appendix C.

Table IV illustrates the value respondents placed on hands-on types of instruction. This instruction preference is significant to note when constructing computer training classes. A preference for hands-on learning supports including computer laboratory work in computer courses to allow students to actually practice on a computer. Table V determines respondent preferences for specific instruction verses more general guidelines and concepts.

Table IV

Learning Preference

Question #68: Learning by doing is a good way for me to learn.

Response	Frequency	Percentage
Strongly Agree	42	33.6
Agree	76	60.8
Neutral	5	4.0
Disagree	1	.8
Strongly Disagree	1	.8
	125	100

Table V

Instruction Preference

Question #69: I prefer very specific instruction to general guidelines and concepts.

Response	Frequency	Percentage
Strongly Agree	18	14.4
Agree	57	45.6
Neutral	32	25.6
Disagree	13	10.4
Strongly Disagree	5	4.0
	125	100

Summary of Parts II and VI

Parts II and VI of the survey indicate that 93 percent of respondents consider learning by doing a good way to learn and over half of them prefer specific instructions to general guidelines. The instruction/learning profile of Class 89S/D shows a preference for structured learning where group or

student to instructor discussion is allowed. These findings support including hands-on type training such as laboratory work that provides well structured and supervised training to students.

Opinions About Microcomputers

Part III of the survey asked the respondents their opinions about the use of computer systems while at AFIT and after graduation. The A to E measurement scale was again used to indicate a "Strongly Disagree" through a "Strongly Agree" opinion. Part III frequency distributions are shown in Appendix C.

Table VI

Perceived Computer Literacy of Students

Question #12: I consider myself to be computer literate. Response	Frequency	Percentage
Strongly Agree	44	35.2
Agree	51	40.8
Neutral	14	11.2
Disagree	8	6.4
Strongly Disagree	8	6.4
	125	100

According to Table VI, 24 percent of AFIT students would not classify themselves as "computer literate", defined in the survey as: "possessing a level of computer knowledge adequate for the skillful, productive application of computer functions for projects I am responsible for as an AFIT student." This

percentage of non-literate students becomes more of a concern in light of the tabulated results in shown in Table VII. Table VII compiles the percentages of students who rate the importance of computer skills at AFIT.

Table VII

Importance of Computer Literacy at AFIT

Question	Frequency	Percentage
#16: Computer Knowledge Important for AFIT success		
Strongly agree	69	55.2
Agree	41	32.8
Neutral	11	8.8
Disagree	4	3.2
Strongly Disagree	1	.8
#18: Would accomplish assignments better with more computer knowledge		
Strongly agree	16	12.8
Agree	49	39.2
Neutral	27	21.6
Disagree	27	21.6
Strongly Disagree	6	4.8

Table VII, CONTINUED

Importance of Computer Literacy at AFIT

Question	Frequency	Percentage
#21: Have assignments I cannot effectively meet due to inadequate computer skills		
Strongly agree	1	.8
Agree	22	17.6
Neutral	27	21.6
Disagree	43	34.4
Strongly Disagree	32	25.6
#20: Computer literacy important to AFIT studies		
Strongly agree	47	37.6
Agree	65	52.0
Neutral	7	5.6
Disagree	3	2.4
Strongly Disagree	3	2.4

Table VII shows students consider computer skills to be important at AFIT. Eighty-eight percent agree that computer skills are important for successfully completing numerous AFIT assignments. Although only 18 percent of respondents cannot meet all their AFIT academic assignments effectively due to a lack of computer skills, 52 percent indicate that if they had more computer skills their academics would improve.

While 76 percent of the respondents would classify themselves as computer literate, over 89 percent agreed that computer literacy is important to their AFIT studies. This difference of 13.6 percent brings up the question of how adequate computer training is at AFIT.

Table VIII summarizes the responses received concerning computer training at AFIT.

Table VIII

Computer Training at AFIT

Question	Frequency	Percentage
#23: Computer training offered during short course met my needs		
Strongly agree	2	1.6
Agree	2	1.6
Neutral	3	2.4
Disagree	18	14.4
Strongly Disagree	100	80.0
#25: I could perform some tasks more effectively with more formal computer training		
Strongly agree	25	20.0
Agree	68	54.4
Neutral	13	10.4
Disagree	16	12.8
Strongly Disagree	3	2.4
#26: Training received AFTER the short course adequately prepared me for AFIT work		
Strongly agree	4	3.2
Agree	43	34.4
Neutral	28	22.4
Disagree	38	30.4
Strongly Disagree	12	9.6

Table VIII, CONTINUED

Computer Training at AFIT

Question	Frequency	Percentage
#27: I basically taught myself the computer skills I needed		
Strongly agree	32	25.6
Agree	61	48.8
Neutral	23	18.4
Disagree	19	15.2
Strongly Disagree	0	0.0
#17: Teaching oneself is better than formal computer training		
Strongly agree	7	5.6
Agree	22	17.6
Neutral	36	28.8
Disagree	42	33.6
Strongly Disagree	18	14.4

Table VIII clearly shows that the majority of the students in Class 89S/D felt the summer short course did not meet their AFIT computer training needs. Only 3.2 percent of the respondents felt that the short course met their computer training needs. Almost 75 percent of the respondents felt that additional formal computer training would allow them to perform some tasks more effectively. With this large percentage seeking additional training, the survey results indicate that most respondents basically taught themselves the computer skills they needed.

A smaller percentage, 38 percent of respondents, indicated that they received additional computer training after the summer short course that prepared them for their AFIT course work. This additional training most likely came in the form of later classes dedicated to electronic spreadsheet, simulation language, and programming language instruction. Overall however, formal training was not how most of the respondents learned. Seventy-four percent relied on self-instruction to learn the necessary computer skills. As an instruction technique, self-instruction was a method only 23 percent of the respondents considered more beneficial than formal computer training. Sixty percent of the respondents did not agree that teaching oneself computer skills was more beneficial than formal classroom training.

Summary of Part III

Part III of the survey shows that three-fourths of the respondents considered themselves to be computer literate but over half the respondents felt they could accomplish academic assignments more efficiently with additional computer knowledge. Only a small percentage of respondents (18 percent) felt their computer skills were inadequate to the point of making them unable to effectively meet course assignments. Overall, strong responses of almost 90 percent indicated respondents definitely considered computer knowledge important to successfully completing AFIT academic assignments.

In the computer training area, respondents resoundingly felt the summer computer orientation course was inadequate. Almost 75 percent credited self-instruction as the technique that gave them the computer skills they needed at AFIT.

Knowledge About Computer Terms/Concepts

Part IV of the survey asked respondents to indicate their knowledge about selected computer terms. These computer terms were chosen for their applicability to AFIT academics. An interval scale was used to measure responses with A= Not Familiar At All, B= Somewhat Familiar, C= Moderately Familiar, D= Very Familiar, and E= Expertly Familiar. To rank the terms by the level of knowledge indicated by responses, weights were assigned to each response option. By using a weighted score the entire spectrum cf familiarity indicated by responses could be taken into consideration and the difference between computer terms could be directly compared. An "A" answer, which indicated no familiarity, was given a value of zero, a "B" received one point, a "C" received two points, a "D" received three points and "E" was worth four points. In this way a "knowledge score" was calculated for each computer term allowing the terms to be ranked according to knowledge score. A perfect score would be a 500, where every respondent selects expertly familiar (125 x 4). Table IX ranks each computer term according to Class 89S/D.

Table IX

Computer Term/Concept Knowledge, Class 89S/D

Ranking	Term or Concept	Knowledge Score	Percentage
1	Floppy Diskette	379	75.8
2	Word Processing	374	74.8
3	Electronic Spreadsheet	342	68.4
4	Hard Disk	341	68.2
5	Microcomputer	337	67.4
6	MS-DOS	329	65.8
7	Electronic Mail	308	61.6
8	AFITNET	249	49.8
9	Modem Operations	231	46.2
10	Database Management	222	44.4
11	MS-DOS Editor	207	41.4
12	VMS Operating System	202	40.4
13	Mainframe Computer	200	40.0
14	File Transfer Protocol	198	39.6
15	Simulation Languages	170	34.0
16	Mainframe Computer Editors	168	33.6
17	Programming Languages	152	30.4
18	UNIX Operating System	72	14.4

Table IX shows that the terms below electronic mail, those ranked eighth through eighteenth, have less than 50% of the possible knowledge points. This may indicate that these areas receive less training emphasis or are areas that the respondents simply rarely if ever need to use. If the terms that score low knowledge scores are important to students at AFIT, the lack of student knowledge in these areas could flag a training deficiency.

Summary of Part IV

The knowledge rankings indicate that the respondents are most familiar with software packages for word processing and

spreadsheet operations, and more basic concepts such as floppy diskettes, hard disks and microcomputers. Electronic mail also earned over 61 percent of a possible 500 knowledge rating. A drop in knowledge level can be seen as concepts become more specific, such as AFITNET and File Transfer Protocol.

The UNIX Operating System received a very low familiarity score, only 14 percent of the possible knowledge score. Frequency distributions for questions 46 through 63 are in Appendix C.

Computer Term/Concept Importance

Part V of the survey asked respondents to indicate the importance of each computer term or concept to their AFIT studies. The same terms were used from part IV and again the scale was an A to E interval.

In indicating the importance of each item A= Not Important At All, B= Somewhat Important, C= Moderately Important, D= Very Important, and E= Vitally Important. The same weight was given to each response as in Part IV. These points calculated an "Importance Score" that was used to rank order the terms. A perfect importance score would equal 500 points, again like in Part IV. Frequency distributions for questions 46 through 63 are in Appendix C.

Table X

Computer Term/Concept Importance, Class 89S/D

Ranking	Term or Concept	Importance Score	Percentage
1	Word Processing	466	93.2
2	Microcomputer	435	87.0
3	Floppy Diskette	406	81.2
4	MS-DOS	386	77.2
4	Electronic Spreadsheet	386	77.2
5	Hard Disk	366	73.2
6	Electronic Mail	314	62.8
7	AFITNET	285	57.0
8	Modem	279	55.8
9	VMS Operating System	277	55.4
9	Mainframe Computer	277	55.4
10	Database Management	236	47.2
11	File Transfer Protocol	232	46.4
12	Simulation Languages	206	41.2
13	Mainframe Computer Editor	191	38.2
14	MS-DOS Editor	148	29.6
15	Programming Language	108	21.6
16	UNIX Operating System	93	18.6

According to the importance scores in Table X, Class 89S/D respondents consider word processing, microcomputers and associated PC areas such as the use of floppy diskettes, MS-DOS and spreadsheet software to top the list of areas important at AFIT. These terms/concepts scored in the 77 to 93 percent importance score range. Importance scores dropped below 50 percent for database management, file transfer protocol, simulation and programming languages, mainframe and MS-DOS editors, and the UNIX operating system. These areas received only 19 to 47 percent importance scores which suggests that they should be considered last when allocating scarce training time.

Summary of Part V

Table X shows the order that respondents rank the survey computer terms/concepts in terms of the importance of each item to their AFIT graduate work. The terms and concepts that received a 50 percent or higher importance score provide information on the areas AFIT students value most. Basic microcomputer concepts such as MS-DOS and common PC software applications such as word processing and electronic spreadsheet are considered highly important while mainframe computer use and computer languages used for simulation and programming operations received low rankings.

Another key point illustrated by Table X is that the UNIX operating system is ranked last in importance with only a 18.6 percent score. This, along with Table IX's last place ranking, indicates that the respondents have no need to learn or use UNIX. In past AFIT computer orientation courses UNIX has been addressed briefly because it was unclear whether it would benefit the students. This research's findings support placing UNIX instruction below those terms ranked ahead of UNIX in Table X.

Comparing Table IX to Table X, it becomes apparent that computer terms/concepts that received high importance scores have much lower knowledge scores. When students rank the importance of a term/concept higher than their knowledge of that item, it may indicate areas where training emphasis should be directed. Because the same weighted scoring system was used to calculate a knowledge and importance score,

comparisons between the scores can be further analyzed to determine where gaps exist between the importance respondents assigned an area and the knowledge they perceived they have in that area.

Importance/Knowledge Score Comparison

In Captain Lenz' research on AFIT Class 89S/D mentioned earlier, no apparent difference in PC knowledge existed between program options as students entered AFIT. If a difference in the computer skills required between program options does exist it could indicate a need to vary the computer orientation training depending on program option. However, comparisons of importance and knowledge scores for each program option revealed only minor variations between program options. Calculations of importance/knowledge scores and graphs of each program option's comparison are located in Appendix D. Comparison findings significant to this research are summarized in the following text.

All six program options indicated the same major gaps between the importance of an area and the knowledge scores it received. The areas where the largest difference existed were the terms/concepts: modem operations, the VMS operating system, and microcomputers. Additional major gaps existed in the VMS operating system for GCA students and in electronic spreadsheet for GSM students.

All program options scored microcomputers, MS-DOS and word processing as the most important terms/concepts. More

than the other options, GSM students considered electronic spreadsheets to be important.

Each program option rated programming languages and the UNIX operating system lowest in terms of importance. The major difference between the terms/concepts scored as least important was that GSM and GLM students considered simulation languages to be fairly important while GCA, GCM, GEM and GIR students all rated simulation language in the lowest three importance rankings.

The lack of any significant difference between program options importance/knowledge scores justifies keeping the computer orientation training the same for all program options. If training resources could allow some specialized orientation training for different program options, areas such as increased spreadsheet training for GSM students would be appropriate.

Now that it appears justified to offer the same computer orientation training to each program option, this training should focus on eliminating gaps the class, as a whole, has indicated to exist between importance/knowledge scores. Figure 2 graphs the comparison of importance/knowledge scores for Class 89S/D. The graph plots in descending order the terms/concepts ranked as most important and compares the knowledge scores calculated for each term/concept. The terms/concepts included in the survey are labeled as survey questions number 46 through 63 on the graph.

The following key of terms/concepts, ordered as they appear on the graph, should be used with Figure 2:

53- Word Processing
46- Microcomputer
48- Floppy Diskette
52- MS-DOS
54- Electronic Spreadsheet
49- Hard Disk
59- Electronic Mail
58- AFITNET
61- Modem Operations
50- VMS Operating System
47- Mainframe Computer
55- Database Management
60- File Transfer Protocol
57- Simulation Language
62- Mainframe Computer Editors
63- MS-DOS Editors
56- Programming Languages
51- UNIX Operating System

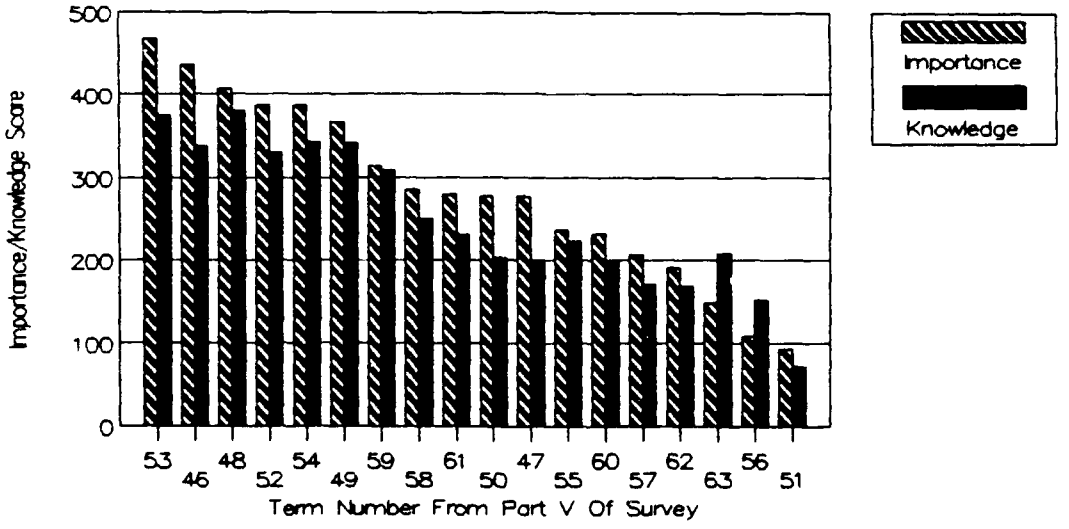

Figure 2. Class 89S/D Importance/Knowledge Score Comparison

Figure 2 illustrates that, in all but two areas, respondents perceived computer terms/concepts to be more important than their knowledge level in that area. In the

areas of MS-DOS editor and programming language use, respondents felt their knowledge was higher than necessary with regard to their importance. These areas should not require additional training emphasis and may actually need less.

Figure 2 shows that some computer terms/concepts have a greater disparity in the importance-to-knowledge ratio than others. This points out where computer training is most lacking. When these imbalances exist in areas ranked high in importance, the gap in knowledge level should be given serious consideration. To make the best use of limited computer orientation time, the training should focus on those areas indicated as being the most important, such as word processing and general microcomputer concepts, and the orientation training provided should be increased most in those areas where the importance/knowledge gap is largest. If training resources can not allow increases in some training areas without cuts in others, the relative importance of the area should dictate whether to cut training back or eliminate an area all together.

Summary of Part VII

The final section of the survey, Part VII, was an open-ended question soliciting any further comments on the subject that respondents may have had. Of the 125 responses received, 71 contained some essay comments. The fact that this survey had a 57 percent essay comment response, and the length and

quality of many of the comments, indicated a high level of concern by the respondents regarding computer literacy at AFIT. In order to present the opinions of the respondents with as objectively as possible, the comments pertaining to computer use and training have been included virtually in their entirety in Appendix B.

To summarize the responses, the majority of the responses emphasized that the computer training they had received at AFIT, especially the Math 262 orientation course, had been inadequate at preparing them for AFIT computing commitments. Comments such as "There is not adequate instruction in the aspects of computer operation that we need most. Other areas, such as UNIX, that we don't need at all were taught. Not enough hands-on training with computers in the summer quarter. Not enough knowledgeable people available to answer questions..." and "Basic microcomputer literacy is vitally important to future LS (Logistics School) students..." represent the majority of the responses.

Many comments focused on the need for skillful instructors to make any computer training given worthwhile. Others mentioned a need for more formal computer instruction and detailed instruction manuals to assist students in achieving skills.

Several comments (about 17 percent of responses) concerned recommendations and questions about the survey instrument itself. These comments are discussed in detail in Appendix F, instructions for further research.

V. Conclusions and Recommendations

Significance of Results

This research is the first time a comprehensive look at the computer needs of AFIT graduate students in the School of Systems and Logistics has been accomplished. The findings from the survey of Class 89S/D should support intelligent decisions on future computer courses offered at AFIT. This research was designed to broaden the knowledge base the AFIT faculty can use when determining what computer skills to teach and the preferred learning style of graduate students. Because computer backgrounds of students will continuously change, this research should be used in conjunction with updated analysis of future classes to structure AFIT's approach to graduating computer literate students.

As new classes arrive at AFIT the computer orientation course will require tailoring to meet the changing needs of the students. This research, with a mail survey format suitable for re-use, should be helpful in deciding the type of changes necessary. It is hoped that the use of this research, coupled with the research of Captain Richard Lenz will provide the support AFIT faculty require to create a truly effective computer training program at AFIT.

This research has identified that the majority of students in AFIT Class 89S/D feel the computer training provided them by the Math 262 orientation course was severely

lacking. To determine where the students placed themselves in terms of computer literacy currently and then see where they perceived they should be, several research questions were addressed:

1. Do AFIT graduate students have academic requirements that require computer literacy? If so, how important is having adequate computer skills to student academic assignments?

2. What computer skills are most important for AFIT graduate academic requirements? How knowledgeable do students consider themselves to be in these computer skills?

3. Does AFIT's current level of computer training provide graduate students with sufficient skills to meet academic requirements?

Research Question One

Figure 3 displays the fact that AFIT academics require a student to have computer knowledge and just how important computer literacy is at AFIT. Responses to survey question number 16, "Computer knowledge is important for successfully accomplishing numerous AFIT assignments" shows that a large majority of the respondents, 88 percent, consider computer skills to be important. The responses to survey question number 20, "Computer literacy is important to my AFIT studies"

gave an even larger percentage, 90 percent, in agreement that computer literacy in general was important at AFIT.

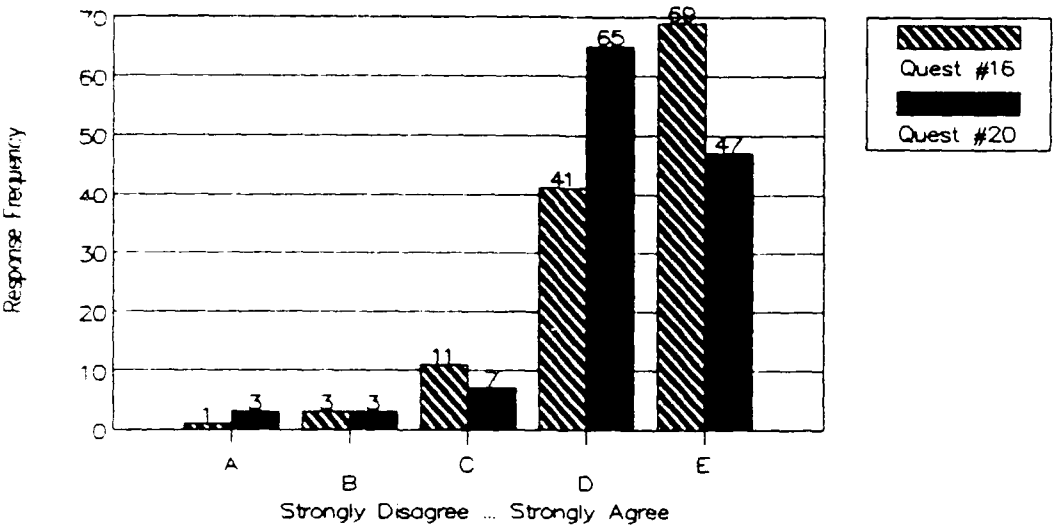

Figure 3. Computer Use/Importance at AFIT

It is clear that there are academic requirements that require computer literacy at AFIT. This fact supports analysis to determine how important computer skills are to AFIT graduate work.

Building on the knowledge that 90 percent of the respondents considered computer literacy to be important at AFIT is the fact that over half, 52 percent, also agreed that they would be able to accomplish assignments better with more computer skills. This illustrates the value computer skills represent -- improved student performance. A smaller percentage of respondents, 18 percent, even felt that

inadequate computer skills actually kept them from being able to effectively meet some academic commitments (see Table VII). Though this number represents a minority, it is still important in that it identifies that inadequate computer skills can act as a barrier to some students' academic pursuits.

The entire AFIT mission of educating is being hindered by poor computing skills. These facts indicate computer skills are very important to student academic responsibilities.

Research Question Two

Having found computer skills to be important in AFIT graduate work the next step was to determine which skills were perceived as being most important and then see how much knowledge the students felt they had concerning these skills. Tables IX and X indicated the ranking of skills selected as representative of those used most in AFIT course work. The most significant findings were that respondents ranked the importance of microcomputers, word processing and spreadsheet programs, and AFIT specific systems such as AFITNET and electronic mail well above any use of a mainframe computer, programming languages or the UNIX operating system (see Table X).

When asked to rank their knowledge of each computer term or concept the students indicated a definite strength in microcomputer knowledge and the use of word processing and

spreadsheet programs over knowledge of mainframe computers and more complex computer skills such as using simulation languages and file transfer protocol (see Table IX). This finding corresponds to the results of Captain Lenz' research where students ranked their incoming knowledge highest in the use of personal computers.

As illustrated by Figure 2, a significant correspondence exists between computer terms/concepts that received the highest importance scores and the highest knowledge scores. However, in all areas except two, the level of knowledge respondents had was less than the importance they assigned each term/concept. All computer terms/concepts except the use of MS-DOS' editor and programming languages appeared to have more value to the students than current training was recognizing. The gap between importance score and knowledge score was greatest for word processing, microcomputer, VMS operating system, and mainframe computer use.

Research Question Three

An overwhelming percentage of respondents felt the computer training provided at AFIT was inadequate. Figure 4 graphically shows the response frequency to survey questions number 23 and 25. Survey question 23, "The computer training provided at AFIT during the summer short course met my computer training needs" is graphed as the "adequate" response. Survey question 25, "I could perform some tasks

more effectively if I had additional formal computer training" is graphed as the "need more" response.

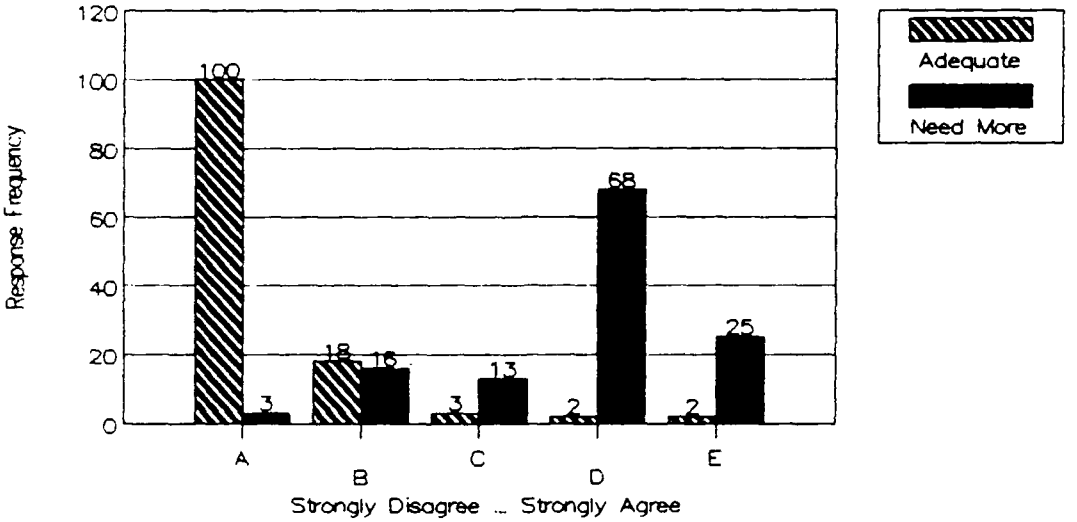

Figure 4. Computer Training at AFIT

An impressive majority, 94 percent, felt the orientation course did not meet their computer needs. When considering the almost unanimous discontent with the training provided through the computer orientation course it is significant that only 38 percent responded that they received training in addition to the orientation course that prepared them for course work (see Table VIII). As shown in Table VII, 18 percent of respondents felt they had assignments they could not effectively meet due to inadequate computer skills. The result of this training dilemma is also apparent looking at the 74 percent of respondents in Figure 4 who felt that more

computer training would enable them to perform academic tasks more effectively.

The point was repeatedly made in responses to the survey's essay question that the problem was not necessarily too little computer training, but was actually a poorly presented orientation course that did not teach the skills students needed to carry on their course work. So, as students see the situation, the quality and not necessarily the quantity of computer training currently at AFIT is inadequate.

Recommendations

The problem should now be resolved with careful consideration of the skills the students have identified as important being worked into a course structured to teach computer skills with a desirable technique. This research has indicated that hands-on, group or close instructor supervision techniques are the preferred learning method of this AFIT class. Noting the results Class 89S/D has shown should provide a foundation for preparation for future AFIT classes.

Only by recognizing that students have specific skills they need to be competent at and focusing on addressing these needs can the computer orientation at AFIT hope to maximize the effective use of its limited time. This research asked respondents to rank their perception of the skills most important to AFIT academics. No significant difference in computer term/concepts importance was found to exist between

program options. With very little variation respondents from each program option ranked microcomputer use, along with basic microcomputer uses such as word processing and electronic spreadsheet highest in terms of importance. AFIT-unique skills such as using the electronic mail and AFITNET system fell in the importance mid-range. Respondents perceived mainframe computer use, database management, simulation and programming languages, mainframe and MS-DOS editors as well as UNIX to be of low importance. Because the time available for computer orientation training is currently limited to four weeks, trainers should focus on providing adequate instruction in the skill areas ranked as most important by students before addressing skills such as UNIX that received low importance scores.

In every area except programming languages and MS-DOS editor use, the importance students placed on the computer terms/concepts analyze surpassed the knowledge level they felt they possessed. These gaps in knowledge should be addressed by increasing or improving the training available in such areas (see Figure 2).

By spending its limited computer training time on skills the students need most, and providing the quality of training necessary to truly prepare the students, AFIT can most effectively accomplish its educational goals.

> **Instruction must be geared to student backgrounds and aspirations... it must be tailored to the needs of the student.** (12:33)

Appendix A: Survey Cover Letter And Survey Instrument

LSG (Capt Harrison) 1 May 1989

AFIT Student Computer Needs Survey

Survey Participant

1. Please take 10 or 15 minutes to answer the attached questionnaire and return it and the answer sheet by May 16, 1989 to the collection box located in the AFIT graduate student lounge.

2. The survey measures the computer knowledge levels and perceived training needs of students in AFIT Class 89-S/D. The survey's primary objectives are to determine if AFIT students have the required computer skills to complete scholastic requirements, and to identify specific areas of training perceived as needing improvement. The data gathered will become part of an AFIT research project and may influence the design of computer training courses at AFIT. I am interested in what you know off-hand and what you consider important. There are no "right" or "best" answers. Your responses will be combined with others and will not be attributed to you personally.

3. Your participation is completely voluntary, but I would certainly appreciate your help. If you have any questions, please contact Capt Gay Harrison at 255-5435 or 878-9252.

Richard E. Peschke, Lt. Col., USAF
Assistant Professor of Logistics Management

1 Atch
Survey

AFIT SCHOOL OF SYSTEMS AND LOGISTICS
SURVEY OF AFIT CLASS 89-S/D

The purpose of this survey is to gather information from AFIT Class 89-S/D for thesis research. All responses will be anonymous.

General Instructions

1. Please answer each question. Select only one answer to each question.

2. Responses will be machine scored so please mark your answers on the computer sheet provided using a No. 2 pencil. Blacken the appropriate circle for each response, erase any stray marks, and don't fold the answer sheet.

3. Please use the comments section at the end of the survey to elaborate on anything you feel this survey missed and to give any feedback you have on this survey.

4. When you have completed the survey, please put the questionnaire and answer sheet in the box labeled "Computer Needs Survey" in the AFIT graduate student lounge. The box will be underneath the student mail boxes.

5. Please return this survey by 16 May 1989. Thank you for your participation.

AFIT Student Computer Needs Survey

PART I. Academic Background

1. In what AFIT graduate program are you enrolled?

   A. Graduate Cost Analysis (GCA)
   B. Graduate Contracting Management (GCM)
   C. Graduate Engineering Management (GEM)
   D. Graduate Information Resource Management (GIR)
   E. Graduate Logistics Management (GLM)
   F. Graduate Systems Management (GSM)

Part II. Instruction Preference. Please answer questions 2 through 11 using the following selection of learning methods, techniques and devices.

   A. Lecture/Instructor Demonstration
   B. Computer-assisted instruction
   C. Confer with/observe other students
   D. Peer teaching
   E. Discuss with instructor
   F. Drill and repetition/Memorization
   G. Examinations
   H. Exercises/Worksheets/Homework assignments
   I. Films/Videotapes
   J. Flipcharts/Vu-graphs
   K. Reading
   L. Pop Quiz
   M. Group projects/Group discussion
   N. Laboratory

Think of the MOST ENJOYABLE learning experience you have encountered, in a course, subject, topic or other learning situation. List the 5 methods, techniques and devices which were MOST helpful to your learning.

2. Most helpful (#1): _____.

3. Next most (#2): _____.

4. Next most (#3): _____.

5. Next most (#4): _____.

6. Next most (#5): _____.

Now think of the LEAST ENJOYABLE learning experience you have

experienced. List the five learning methods, techniques and devices that were LEAST helpful to you in achieving your learning objectives.

7. Least helpful: _____.

8. Next least: _____.

9. Next least: _____.

10. Next least: _____.

11. Next least: _____.

PART III. The following questions concern your opinions about the use of computer systems while at AFIT and after graduation.
Answer each using the rating scale provided below.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
A	B	C	D	E

12. I consider myself to be computer literate i.e., I possess a level of computer knowledge adequate for the skillful, productive application of computer functions for projects I am responsible for as an AFIT student.

13. I have used the computer to improve the efficiency of my scholastic endeavors at AFIT.

14. Formal computer training should be increased at AFIT.

15. Computer literacy will be important to me in my career after I leave AFIT.

16. Computer knowledge is important for successfully accomplishing numerous AFIT assignments.

17. Teaching oneself computer skills is more beneficial than formal classroom training.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
A	B	C	D	E

18. I would be better able to accomplish my academic assignments if I had more computer knowledge.

19. I will not use a computer once I graduate from AFIT.

20. Computer literacy is important to my AFIT studies.

21. I have academic demands that I cannot effectively meet because I do not have an appropriate level of computer knowledge.

22. I am comfortable using a computer.

23. The computer training provided at AFIT during the summer short course met my computer training needs.

24. Computer literacy is more important in my AFIT studies than in my past assignments.

25. I could perform some tasks more effectively if I had additional formal computer training.

26. Additional computer training, received AFTER the summer short course, adequately prepared me for AFIT course work.

27. I basically taught myself the computer skills I needed for AFIT

PART IV. Computer Knowledge. Below is a list of computer terms. Some refer to concepts, some to specific kinds of equipment, and some to programming. Read through the list and use the scale below to indicate your knowledge about each item.

Not Familiar At All	Somewhat Familiar	Moderately Familiar	Very Familiar	Expertly Familiar
A	B	C	D	E

28. Microcomputer (defined here as any personal computer)

29. Mainframe Computer

30. Floppy diskette

31. Hard disk

32. VMS Operating System (used by "Hercules"/CSC, and "Starlifter"/ISC.)

33. UNIX Operating System (used by "Dragonlady"/ASC, "Blackbird"/SSC, and "Galaxy"/ICC.)

34. MS-DOS

35. Word Processing

36. Electronic Spreadsheet

37. Database Management

38. Programming Languages

39. Simulation Languages

40. AFITNET

41. Electronic Mail

42. File Transfer Protocol

43. Modem Operations

44. Mainframe Computer Editors (EDT and/or VI)

45. MS-DOS Editor (Edlin)

PART V. Computer Term Importance. Below is the same list of computer terms/concepts as in Part IV. Read through the list and use the scale to indicate the importance of each item to your AFIT graduate work.

Not Important At All	Somewhat Important	Moderately Important	Very Important	Vitally Important
A	B	C	D	E

46. Microcomputer (defined here as any personal computer)

47. Mainframe Computer

48. Floppy diskette

49. Hard disk

50. VMS Operating System (used by "Hercules"/CSC, and "Starlifter"/ISC.)

51. UNIX Operating System (used by "Dragonlady"/ASC, "Blackbird"/SSC, and "Galaxy"/ICC.)

52. MS-DOS

53. Word Processing

54. Electronic Spreadsheet

55. Database Management

56. Programming Languages

57. Simulation Languages

58. AFITNET

59. Electronic Mail

60. File Transfer Protocol

61. Modem Operations

62. Mainframe Computer Editors (EDT and/or VI)

63. MS-DOS Editor (Edlin)

PART VI. Learning preference. The following questions concern your preferences in learning a skill. Use the scale below to indicate your preference.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
A	B	C	D	E

64. I find I learn best when I work alone.

65. I have no use for the theories and principles behind a thing. I just want to know how to use it to get what I want from it.

66. I find that working in a group helps me learn.

67. I would use a computer much more if I knew enough to get started teaching myself.

68. Learning by doing is a good way for me to learn.

69. I prefer very specific instructions to general guidelines and concepts.

70. I like to know a lot about the principles behind a thing before I try putting it into practice.

71. I dislike using a computer and will avoid using one if it is possible.

END OF COMPUTER SCORED QUESTIONS
PLEASE PLACE ADDITIONAL COMMENTS ON NEXT PAGE

VII. Open-ended question. Please comment on any concern you have about student computer use and training at AFIT that has not been covered in this questionnaire.

THANK YOU FOR YOUR PARTICIPATION
PLEASE PLACE SURVEY ANSWER SHEET IN BOX
LOCATED IN STUDENT LOUNGE

Appendix B: Survey Essay Responses

The following is intended to be an objective listing of the comments received from Part VII, the open-ended question of the survey. To maintain an objective presentation of the comments received, no significant editing was done to the comments. Grammar and spelling were changed only when necessary to be sure meaning was clear. Part I of this appendix is comments from the program option managers who were asked to comment on the survey instrument and intent of the research. Specific comments dealing with survey design are incorporated more extensively into Appendix F, Recommendations for Future Research.

Part I. Instructors' Comments

Major Farr, GCM Program Option Manager

I have avoided any sophisticated computer-related demands in our curriculum (as far as applications of computer literacy to contracting career field). I believe this is true for three reasons:

1) The career field has been slow to embrace the possibilities/ advantages of computers.

2) I don't have enough knowledge myself (though that continues to improve).

3) We lack resources (hardware/software).

Lt Col Westfall, GLM Program Option Manager

- how do students obtain software (any ethical problem here?)

- do students do their own homework using computers for assignments (i.e. how much "homework sharing" is going on. -- is that a problem either ethically or as pertains to student learning. This is a small but important segment of our student population.

Problems w/ questionnaire:

Part II on type of Instructional Techniques

- courses vary <u>widely</u> on how they are taught.

  ex: one course I teach has <u>no</u> computer usage,
  one course I teach is <u>100%</u> computer based.

It is difficult to give an "average" answer to this question which is meaningful.

- on Part III, because we are talking about 70+ students, again the variability of individual differences makes it difficult to get a meaningful "average" answer.

Major Triscari, GSM Program Manager

Part II.

Referring to choices B through N - "These are not mutually exclusive! -- I am having difficulty rank ordering them. Also -- *Papers? *Case Studies?"

Referring to "... your graduate program?" - "Overall courses? or just mine (I'll assume overall) -- But this will just be my best guess at what other instructors are doing"

Question 14.

Referring to "Formal ... " - "What does this mean? Graduate credit implied?"

Question 18.

"accounting for only a small amount of variance!"

Question 22.

"Most" inserted before "My students ... "

Question 24.

Referring to "... past assignments" - "?"

Question 25.

"additional formal" scratched out, "better" added.

Lt Col Holt, GEM Program Option Manager

In the GEM Program, we learn management using current management tools (computer tools) But, our Data Bases are on Main Frame Computers. My students need to be able [to] interface well with the two computer systems and also Interconnect the two systems.

No one should know anything about Edlin.

My current students are having trouble with AFITNET But I Expect that the next class won't.

Lt Col McBride, GIR Program Manager

The new intro to AFIT computers this year should be a significant improvement.

As important as computer literacy is to all AFIT students, I'm concerned that we could focus too much on training people in particular skills and miss the opportunity to educate people on properly applying information technology in Air Force organizations. In other words, information management concepts are equally important.

Dr. Kankey, GCA Program Option Manager

The GCA students enter with a widely varied computer literacy. Some are experts while some are novices. We use MS-DOS, and VMS on the VAX.

Hopefully the revised intro course will focus on the above.

Part II. Students' Comments

- Summer Short Course last year was a waste of our time and was panic inducing.

- I feel because of that fiasco that I missed a golden opportunity to learn about micro-, mini-, and mainframe computers.

-- virtually "programming ignorant" and I severely lack in AFITNET, FTP, ISC, and CSC knowledge and understanding.

- This new approach (teaching small groups) should be extremely beneficial ...

- LOG 490 = SUPERIOR CLASS. However, should make it 2 semesters: one for DBASB and one for spreadsheet.

- AFIT Computer Fest should not be held (nor recommended) until after the new students have had adequate instruction in what to look for. I "invested" $2500 without knowing what I needed: what's a hard drive, floppy, RAM, letter quality printer, CGA, EGA, applications packages, etc, etc.

The computer course h're was a JOKE!

Unless the course is transferred to LS, EN is not going to change the computer course.

- I knew how to use a computer prior to coming to AFIT so I didn't have much trouble with any of the computer assignment. I do feel that much more homework and lab assignments should be given. I saw many students who never even tried working on the computer at home, they expected the instructor to tell them, and then complained when they didn't understand.

AFIT definitely needs better computer instruction for new personnel, but some of us really didn't need it because of prior knowledge.

Questions 4 and 5 - Answers assume good, interesting instructors and reading material.

Question 14 - Or made available to those who need it.

Questions 65 and 69 - I like to know how things work but it is imperative that I be able to operate them. So, specific instructions are necessary and theory is nice.

I guess I'd choose the self paced, on-line computer training offered at so many other institutions. I pur ased some of this instructional software to learn wordprocessing (Word Perfect 5.0). AFIT might do more in this area, just having the computers do the teaching with instructors there to answer questions + give advice. This is the way they teach 1st graders computers and it works.

Computer use is necessary only in that it helps do assignments. In that sense, it is necessary at AFIT.

Realize that the types of Instructional Preference may differ for different subjects (e.g. Comm vs. SLAM).

---

1. I believe computer instruction at AFIT is adequate. The emphasis should be on the management of computer systems rather than nitty gritty programming.

2. By having a basic knowledge of spreadsheets and data

bases (as given in LOGM 490, and simulation as given in other subjects) the student knows what computers can do for him without actually being able to do fancy programming.

3. As a result in follow on assignments he can effectively control and converse with the 'computer' geeks that will actually be doing the programming.

There is not adequate instruction in the aspects of computer operation that we need most. Other areas, such as UNIX, that we don't need at all were taught. Not enough hands on training in the Summer quarter with computers. Not enough knowledgeable people available to answer questions when they arise. Most people didn't need to learn very much MS-DOS. More emphasis should have been placed on adequately teaching AFITNET and E-Mail. Should have mastered during summer, instead of months later as it took most people.

I feel Computer training is necessary and important to success at AFIT. However, it should not be mandatory. Some people have the necessary skills when they show up & should have to be subjected to a beginner course. As a suggestion, perhaps a twice a week computer lab that you could go to if you need help. This should be done during the 1st full quarter. A beginning computer course should be taught during the summer short session as well.

Basic microcomputer literacy is vitally important to future LS students. Several controversial issues must be settled by the administration: whether students should be required to buy home computers; whether the Summer Short course should be eliminated or expanded; whether professors should be allowed to administer their courses such that students not owning home computers or specific software packages are put at a considerable disadvantage; and many more.

More obviously, AFIT must inform applicants and selectees about what is sure about the computing environment they are about to enter. Don't leave this up to the sponsors. Don't expect students to buy a complete system and become computer literate during his/her first month at AFIT. One Admin. Sergeant told me 2 months before I PCS'ed to AFIT that they would teach me all the computer skills I needed to know when I got here. There must, at least, be a knowledgeable focal point at AFIT for conscientious future students' questions about computer requirements.

I would also recommend several improvements to the Summer Short course. Use the results of this survey to devise a curriculum. Teach it in the LS school by LS faculty. (Any

recent LS school graduate would be a good teacher; a mainframe whiz with an M.S. in Computer Science would probably be a bad teacher.) Do not waste time teaching UNIX to LS students. Just teach 'em what they need to know.

About Question 23:

The tools and time for teaching MS-DOS were available during the summer. We could all have learned a lot from that course had it been skillfully taught (Bralick did OK, the Hindu lady did not).

Perhaps a tutorial disk for everyone to do would help a lot.

Part IV of Questionnaire; Answers may vary on subject being learned. Learning a skill is different from learning computers. Learning computers is best in groups of 2-3 persons.

The computer training at AFIT would be a waste of time regardless of the structure of the computer training classes.

- Revamp summer short course with hands-on training. Make it applicable to what we will do here at AFIT.

- Choose a different instructor than Dr. Panna(?). She was terrible, hard to understand.

I believe there is a big need for a formal computer instruction course (better than the one we had to endure) prior to starting the main classes. MS-DOS should be taught for PC use. Other areas to teach should include general wordprocessing and spreadsheet applications. Better instruction is needed up-front on how to use the CSC, E-Mail, and AFITNET in general. Further instruction would help with SAS. Additionally, incoming students should be advised to have a computer w/ hard disk and modem, printer with skills already started in wordprocessing and spreadsheets.

The summer short course for AFIT Computer training needs to be much improved in order for it to be of any use.

1) Teach in classroom where teacher and students have micros for hands-on training.

2) Develop an exercise guide to get the student started and working on easy commands, prior to getting instructor lecture.

I thought the Summer short course was OK but didn't cover nearly enough. The problem is differing levels of computer literacy. Perhaps one way to surmount this problem is to break the class up into smaller labs with computers. Also assign more take home project work in the class to enhance skills. Also, if I didn't have a modem at home, I'd never use the mainframe. Instructors shy away from using the mainframe because you can't take it with you.

I do not like computers, but I realize their importance. As a result, I think AFIT should take a more basic and practical direction in their instructional courses. Make computers fun. Most of the courses here make computer work difficult and tend to turn people off of computers rather than turn them on to computers.

---

1) We don't need to tell you that the computer "refresher" was a waste.

2) Part of the sponsoring program should be to teach the newbies the basics of AFITNET/E-Mail.

3) LOGM 490 should be a required course for all students (use of dBase and Quattro).

4) Strict guidelines should be posted around the Z-248s to say what modifications to hardware/software is allowed.

It's very hard for AFIT to "give you all you need" in your time here. People need to come better prepared to deal with computers before they get here.

Summer Short Term useless to me except for AFITNET lessons. I was told the videos was excellent.

Definitely not enough on the use of AFITNET, CSC, and SAS! Like too many other courses at AFIT, instructors spend too much time on topics which offer little practical value. Just one class offered by a local computer training company presents more material in a better way in three days than one full quarter at AFIT! Principles and theory are great - but ask any AFIT graduate (that didn't come back as an instructor or go on to a PhD Program) to explain any principle or theory taught at AFIT. I'm confident their level of retention will be limited indeed!

The computer courses at the beginning of the short summer semester would have been much more effective if there had been PCs/Mainframe terminals to work with during the class. Most people I talked to learned more from experimenting with the computers than from the classroom lectures. In addition, the user manuals for UNIX and VMS need to be improved. While the engineering students may find them helpful, they were worthless to me. A lot of the info in them is either out of date or doesn't make any sense unless you already know how to use the operating systems. They need to be rewritten with the novice in mind. Tutorials would also help.

---

1) Recommend small groups.

2) Recommend a quick and dirty list of steps (keystrokes) for all common operations needed/used by AFIT students.

Use of standardized SW so that everyone is using the same package (i.e. spreadsheets, WP, DBMS, etc.)

A seperate mainframe + PC classes covering the general operations of the SW pkgs needed (i.e. for PC - use of spreadsheets, WP, DBMS, use of mainframe SAS, wordprocessing, file transfer, etc.)

The summer course was not at all effective. Should be taught in a lab setting. Should spend more time on SAS, Mail, and EDT editors as well as built in help guide.

Prof Dan Reynolds teaching of the computer use as "an aside" to his teaching of statistics is what really gave me my present level of computer literacy. Mostly it was just motivation by desperation that got me to dig in and learn something about the computer.

It is very frustrating when there are too many types of software --- it makes it difficult to determine what is the adequate mix --- the recommended set of software tools (which spreadsheet SW? which programming language? which Mainframe language?)

Individuals have very different learning, or cognitive, styles ranging from very heuristic to very analytic. Computer training programs should be taylored to the wide range of learning styles (i.e. in class lecture plus hands on training plus opportunity to work individually).

My feelings are that they should teach: 1) word processing; 2) MS-DOS; 3) how to really use SAS, AFITNET, etc; 4) spreadsheets; 5) data base mgmt; 6) simulation; 7) and DSS, but we went (and are going) above and beyond what we were taught, what an introductory course should teach, and what we really need to know to function as Air Force managers.

AFIT needs to customize its computer classes to two-four different levels, depending on incoming knowledge. Some people come in with mainframe experience, while some come in with PC experience. A class using a spreadsheet would be very helpful. Also, the best thing would to have help sheets printed on the standard things we do on the computer like file transfer, executing SAS, transfering file from SAS to Statistix etc. We only do a few things so they could easily be documented by the responsible instructors. Possibly a computer course that has modules for each "subset", attendance would not be mandatory, but in later classes the use of the "subset" would be assumed.

The computer course "Intro to AFIT Computer Systems" was an absolute, unequivocal waste of time! Poor teachers, poor structure, poor classroom set up -- unexcusable.

The summer intro to AFIT computers was a waste of time! There was no effort made to determine skill levels of the students. We were all lumped into one group. The Air Force Officer who briefed us on mainframes was totally oblivious to the skill levels of his students, had no teaching ability, and was insulting to students who asked questions. It was impossible to see the large T.V. screen from about the fourth row of the auditorium, on back. There was no hands-on mainframe training or personal instruction. We had to figure out Electronic Mail on our own as instruction was even weak in this area.

Some of us, myself included, were raw beginners with PCs. This course was frustrating and left a bad impression about AFIT which persists to this day. I played "catch-up ball" on computers in both my stats and SLAM courses because no foundation was laid during the summer short term.

The Summer Computer familiarization should tailor material to what Dan Reynolds requires (for students going into his courses). This is where the majority of my computer time was spent.

Instruction should focus on 1 mainframe system.

--Use Reynolds to structure his requirements for Summer short courses.

The summer term computer course needs to be improved. The size of the class needs to be reduced, and, if possible, teach the course in the computer rooms (#315 etc). Not in the auditorium. This will allow for more one-on-one instruction. Also, design a test so that students with computer skills can test-out of the class rather than sit through the class.

In the course curriculum, move the main computer class (dBase mgt, simulation, etc.) up so that the students can use the information in the subsequent quarters. A lot of students would have like to do their thesis work in computer-related areas but by the time they took the class, they had already committed to other areas.

Formal Training at AFIT should be improved. We could have learned all the necessary concepts during the short term computer class. It was poorly run and computer literacy was considered a prerequisite(?).

Once you know how to turn it on, use MS-DOS, and start the utilities you are sufficiently prepared to continue. Some introduction to the hardware (descriptive) and the utilities/ applications (purpose) would be helpful as well.

An ability to access AFITNET and send/receive files is essential at AFIT. The summer short course did not teach the new computer user how to use the system. Repehtive practice with reinforcement is required if this is to become a foundation skill for other courses such as statistics. This type of practice can only be achieved with hands on practice in a lab.

Most computer illiterate students like myself at the beginning of AFIT, learnt their current skills from the statistics lectures or from more experienced students... If critiques had been filled out at the end of last years short course by all students the faculty could not have ignored the unanimous criticism: their is no benefit in having a computer guru "teach" introduction to computers if he or she cannot put themselves at the level of the students. This means that the teachers MUST use laymans terms until the terms are explained. After 2 weeks of the summer course Janet, the system manager had the unenviable task of starting at the beginning to teach what the PhD qualified

faculty had been unable to teach: how do you use AFITNET, how do you use a MS-DOS machine. What was really amazing was that faculty members did not ever comprehend that the majority of students could not understand the foreign language (computer jargon) which was being used

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1) I have just discovered that my career field leaders have settled on Lotus as the standard spreadsheet to use for reporting and centralized efforts. Perhaps selection of a spreadsheet program for teaching at AFIT could include inputs from MAJCOMs and HQ USAF to determine what is being most widely used.

2) New students should be strongly encouraged to get a modem, early. It is needed most to access SAS during the 1st two quarters. If more people had modems and could do SAS labs from home, bottlenecks near due dates might be avoided.

3) Col Wesfall should slow down during Quattro instruction, at least call out the keystrokes he's making, clearly and more slowly.

4) Simple-1, as everyone knows, is far from perfect.

5) Publish a list of public domain software available on AFIT computers.

6) Hire a technical writer to improve the clarity of exams written by computer geeks, statisticians, OR/MS wienees and other quantoids. Current exams are not valid, as they measure students' ability to guess the instructors' meaning versus measuring learning.

Have people who know how to instruct teach the Summer Short course. Make it someone from the LS school and do not assume people know anything about computers.

I like well structured well organized flip charts or view graphs but <u>they should be given to students</u> as handouts

- The accompanying lecture should involve general concepts with specific examples to clarify points.

I like group projects when I can pick the people I work with.

Summer Term was a joke!

Need 1 qtr - spreadsheets
1 qtr - MS-DOS
1 qtr - dBase
1 qtr - word processing
no - simulation

Best combination for future assignments.

No Edlin - A mundane dinosaur that has no business being taught!!

Students should have info about type of system (PC) that would be most useful for AFIT, BEFORE THEY HIT CAMPUS.

Summer short term is a great time for intro, but should be hands-on vs big lecture sleepy time

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Don't let people that have trouble speaking english teach computer courses! Also, don't let computer "geeks" teach computer courses for beginners.

The AF (AFIT) needs to bite-the-bullet and prepare proper justification that authorizes them to issue computers (Z-184 Laptops) to students who can't or don't purchase their own computers. I was one who couldn't purchase a computer and have suffered greatly as a result. Unless a person lives at the school, there just aren't enough computers available at the right times to allow a student to learn the computer systems, learn the software, and use the systems and software to complete required coursework.

I think people from AFIT/LS should teach computer in the summer to LS students, instead of EN instructor.

MS-DOS class in summer short term terrible. Students range from computer illiterate -- genius and class does little for any of us. Suggest smaller, lab-type classes with more exercises -- can't learn computer operations in an auditorium.

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1) I think it is clear that using a personal computer for papers, homework assignments, thesis, and projects has become the "rule" rather than the exception. If I did not have a computer at home with a modem to connect to AFITNET I would have probably spent twice as much time trying to complete assignments.

2) The question about whether computer instruction at AFIT should be increased misses the crux of the problem i.e. the quality of AFIT instruction is substandard. Intro to AFIT computer systems was a joke! LOGM 490 was worse. AFIT should not be teaching dbase III + Quattro, it should teach database management + spreadsheet applications, (when to use one versus the other) and merely use dbase III + Quattro as a vehicle to facilitate that process.

AFIT should offer short courses in "how to" use various software packages on a pass/fail basis. Instructors in both 490 + 590 graded computer projects as if the students were training to be computer scientists.

Summer short term course: The MS-DOS videos we saw were very good, except the speaker went so fast, I could not take notes fast enough to keep up. Since I knew absolutely nothing about MS-DOS when I came here (except how to spell it!) the rapidity with which the material was covered put me at a disadvantage. What you need is a programmed learning exercise book that matches the MS-DOS videos. Then a student could go practice at a leisurely pace what was taught by video.

LOGM 490 The level of programming knowledge expected of students to complete the second dBase project was wholly unreasonable SLOW DOWN THE PACE!

The summer short course is a good idea, however more thought should go into the selection of the instructor. It is sad when the most helpful instruction during the course came from a videotape. An additional note on the instructors - Capt Bralick did a fine job of instructing his segment of the course. The VMS segment was extremely lacking in competent instruction.

Summer Short Course on computer learning AS TAUGHT was a total waste of time.

Micro's should be mandatory requirement of an AFIT Grad Student.

Computers at AFIT (except for specialized courses) are used for word processing, briefing presentations (Harvard Graphics), and simple spreadsheets. I don't understand the emphasis on the subject. A person of just average intelligence can learn to use computers well enough to get through AFIT with no formal training.

I knew nothing about computers before AFIT. What I have learned is from doing myself. This has left a very distasteful experience about AFIT with me. The Summer Short Course taught me nothing. Every time a staff member taught me something about a computer it was over my head. I needed stuff like - This is how you turn it on, This is how to log on/off, etc.

Summer short course should be tailored to those who know nothing about computers (maybe a pre-test to determine aptitude and "test out" of course). DSS course could either be eliminated, or be a course on "use" of DSS, too much time wasted on re-applying the same techniques already used/learned in other courses.

The labs at AFIT are not very efficient. The time is spent either doing homework or as a lecture. Need more hands-on training. Teach us the "tricks" + "short cuts" of computers.

My experience with computer instruction, and computer aided instruction during undergraduate, work and graduate related activities have been disasters. Every time I've sat in front of a PC or terminal in a classroom environment, something has gone wrong. Something (hardware problems, S/W problems, or data entry mistakes) always seems to foul things up. However, deep down I know there is a great learning potential, if only the computer aided learning environment was set up properly. For it to work properly, the instructor should know what he plans to do well ahead of time, and should actually practice the scenarios before the class (kind of like dry-run briefings). Any programs, data sets, etc. should be typed in ahead of time for the students. Notes should be given to the student up-front with explicit instructions for recreating the data sets and programs, and any exercises which will be performed on the computer. Notes must be exact (i.e. which keys to hit and when to press enter). Notes should also be complete so that the student does not have to write things down while working on the computer.

Learning how to operate a computer is very similar to driving a car. You have to experience it. The instructor needs to know where he is going, and the student does not need to worry about faulty equipment, or jotting down on a piece of paper while trying to learn to handle the computer.

1.) The Summer Short Course was a disgusting SHAM.

2.) Stats students should be given the SAS programs; explain briefly what you are giving, ... but let the students spend their time analyzing statistical data etc ... NOT becoming SAS experts. How many opportunities will we have to use SAS in future assignments? Very few. The school should emphasize use of PC packages... Statistix, QBS, Learning Curve... we can take disks with us but not the mainframes!

3.) All curriculums should be required to take a modeling course, ie SLAM.

4.) Finally, I don't want computer engineering geeks teaching me how to use a computer ... They barely knew how to themselves (They did know shortcuts... but weren't supposed to teach that!)

Recommendation

For the summer short course... an LS recent grad should teach the "how to use" portion of the course. Or give an LS upperclass student one day out of the summer short course to tell them everything they need to know to use the school's systems.

Summer short course was a complete waste of time. As a computer illiterate entering AFIT, I had to teach myself just to keep up. AFIT could be a much less traumatic experience early on if we had some useful computer training.

Overall, I feel the computer courses taught at AFIT are not adequately taught. The courses are set up for an intermediate level of computer knowledge. As a result, people like myself with no computer experience before AFIT, end up putting in 30-40 hrs per week on just the computer courses. I'm sorry but I do not see the point in that much effort going to one course.

More time should be spent on the computer to give those who need it, the time to become comfortable with computers. Don't take computers and cram it down our throats! This may be the military but teachers here can still be a little more aware of the students (fellow officers and grown men) and what circumstances are coming into play.

Redesign or throw out the summer short term computer class. Waste of time!

Should make various types of training available for those of us who are literate, teach us new packages we can use @ AFIT (Quattro, Statistix, SAS, Word-Perfect). I stopped going to summer course on 3rd day.

I've heard rumor of integrating computer training w/ math summer course. DON'T! The math class was just fine. Improve computer training by targeting different levels of knowledge.

The summer short term computer class was worthless! Thank goodness for the guys in my group who knew MS-DOC and were patient enough to help me out. As for file transfer and using AFITNET - forget it. I can do the basics - again thanks to helpful fellow students. You couldn't see or hear anything in that Engineering Auditorium.

AFIT needs to put out to students selected for the program a list of computer requirements while here at AFIT. This way, student become familiar with microcomputers, at least, at their last base. Before arriving I had no idea what would be expected in the way of computers. The summer short term is a waste. Revise it or else save money by issuing out MS-DOS tutorials on disks. Dr Panna could not be heard or understood in the auditorium.

On hardware (systems) the AFIT Computer Fair should be sooner (immediately after arriving). This way students have a full month to learn on their systems before starting the graduate courses.

Timing of computer training - recommend a limited course as part of the short term, and workshops and seminars (1-2 hrs) during the summer full quarter (once students have been exposed to the system, they will better know what questions to ask.)

-Quality of instruction is essential to courses in this topic. The present quantity focus just overwhelms us.

-Eliminate projects or portions of courses which are nothing more than tests of human stamina.

-Concentrate on the fundamental skills necessary to be "successful" in using given software. I have found that if I have a "mastery" of the basic skills, I can do a heck of a lot more with a software package.

-Uniformity of instruction is lacking. As a matter of fact, I plan to spend a week this summer with a fellow student who had

a different instructor than I had to really learn how to use the spreadsheets the way I know I will need to use them in my next job. In my course, we got hung up on "pretty" and macros - what we really needed was to learn the POWER of spreadsheets.

-In dBase3+, I don't think I've got the needed level of database mgt knowledge to be comfortable with it in my next job.

Currently, the Intro to Computers (Summer Short) Course doesn't adequately cover our needs. Forget about EDLIN (virtually useless), and leave SAS until you need it for Stats I & II. What we need is a simple guide to MS-DOS (say a handout containing commands + explanations of them) which is then reinforced by actioning the commands with a floppy disk in a lab class. Similarly, instruction on VMS +/or UNIX should follow a study guide in a lab class. This section of the course should cover at least logon + logoff, E-Mail, phone, FTP, upload/download, editing, and place particular emphasis on what to do when you stuff-up (e.g. logon twice). It should be structured and follow a handout guide. Don't let some geek teach it - they just want to play around and talk geek things. Some instruction/advice on the various wordprocessors might also be nice. Also, if somebody knows something already, permit them to skip the particular class(es).

AFIT must remember that there are situations out in the Air Force like my last assignment (My Squadron CC refused to have a computer in the orderly room because he saw it as a "time-waster"). This Colonel is not an exception. Many people don't know computers and are afraid. New students must be given lots of computer training in many different formats (classroom, CAI, Books, Video-Tape's, Tutor's).

This current situation is intolerable. When I went to ask for help from the female [illegible] an professor, she told me "just go to computer room and figure it out yourself"

Appendix C: Frequency Table for Class 89S/D

The following table lists the responses for each survey question. Responses are broken into specific program options.

Option:		GCA	GCM	GEM	GIR	GLM	GSM	TOTAL
#1	A	7	0	0	0	0	0	7
	B	0	7	0	0	0	0	7
	C	0	0	11	0	0	0	11
	D	0	0	0	7	0	0	7
	E	0	0	0	0	48	0	48
	F	0	0	0	0	0	45	45
								125
#2	A	1	2	0	1	12	12	28
	B	0	0	1	1	3	5	10
	C	0	1	2	1	4	3	11
	D	0	0	0	1	3	0	4
	E	1	2	2	0	7	9	21
	F	0	0	0	0	0	0	0
	G	0	0	0	0	0	0	0
	H	1	0	2	0	4	3	10
	I	0	0	0	0	3	1	4
	J	1	0	0	0	1	1	3
	K	0	1	0	0	4	1	6
	L	0	1	0	0	0	0	1
	M	2	0	4	1	5	6	18
	N	1	0	0	2	2	4	9
								125
#3	A	0	2	2	0	9	10	23
	B	1	0	0	2	3	5	11
	C	3	0	3	1	4	4	15
	D	0	1	0	0	0	1	2
	E	0	1	1	1	7	1	11
	F	0	0	0	0	0	0	0
	G	0	0	0	0	0	1	1
	H	2	1	1	2	10	6	22
	I	0	0	0	1	4	1	6
	J	0	0	0	0	1	3	4
	K	0	1	1	0	1	2	5
	L	0	0	0	0	0	0	0
	M	0	0	2	0	2	3	7
	N	1	1	1	0	7	8	18
								125

Option:		GCA	GCM	GEM	GIR	GLM	GSM	TOTAL
#4	A	0	1	1	1	6	7	16
	B	0	0	0	0	6	1	7
	C	0	2	2	1	11	7	23
	D	0	1	3	0	2	2	8
	E	0	2	1	1	5	4	13
	F	0	0	0	0	1	1	2
	G	0	0	0	0	0	0	0
	H	1	0	2	1	4	8	16
	I	0	0	1	0	2	4	7
	J	2	0	0	0	1	1	4
	K	1	0	0	1	5	4	11
	L	0	0	0	0	0	0	0
	M	2	1	0	1	3	4	11
	N	1	0	1	1	2	2	7
								125
#5	A	3	0	3	3	3	2	14
	B	0	1	0	0	2	3	6
	C	1	0	1	1	6	6	15
	D	0	1	0	0	3	3	7
	E	0	0	1	1	4	4	10
	F	0	0	0	0	0	2	2
	G	0	0	0	0	0	3	3
	H	0	0	1	0	9	5	15
	I	2	1	0	0	4	4	11
	J	0	2	0	1	5	2	10
	K	0	1	3	0	6	3	13
	L	0	0	0	0	0	0	0
	M	1	1	2	0	3	6	13
	N	0	0	0	1	3	2	6
								125
#6	A	1	0	1	1	4	1	8
	B	0	0	2	0	4	2	8
	C	1	1	0	0	3	5	10
	D	1	0	0	0	3	0	4
	E	0	0	1	1	6	9	17
	F	0	2	0	0	4	0	6
	G	1	0	0	1	2	0	4
	H	1	1	0	2	1	6	11
	I	0	0	1	0	5	2	8
	J	0	1	1	1	3	3	9
	K	1	1	0	0	5	6	13
	L	0	0	0	0	0	0	0
	M	1	0	1	1	6	7	16
	N	0	0	4	0	2	4	10
								124

Option:		GCA	GCM	GEM	GIR	GLM	GSM	TOTAL
#7	A	0	1	1	0	1	1	4
	B	0	0	1	0	4	3	8
	C	1	0	0	0	0	0	1
	D	0	1	0	1	5	17	24
	E	0	0	0	0	1	0	1
	F	3	0	2	2	7	6	20
	G	0	0	1	1	5	8	15
	H	0	0	0	0	0	0	0
	I	0	1	1	0	1	1	4
	J	0	0	0	0	1	0	1
	K	0	0	0	0	3	1	4
	L	3	2	5	2	17	5	34
	M	0	0	0	1	1	3	5
	N	0	1	0	0	2	0	3
								124
#8	A	1	0	0	0	2	3	6
	B	1	0	0	0	2	4	7
	C	1	0	0	1	0	2	4
	D	0	2	2	0	4	5	13
	E	0	1	1	0	1	3	6
	F	0	0	2	1	5	9	17
	G	2	3	2	1	9	3	20
	H	0	0	0	0	1	2	3
	I	0	0	2	1	1	1	5
	J	0	0	0	0	3	1	4
	K	1	0	0	0	1	1	3
	L	0	0	1	2	7	8	18
	M	0	0	0	0	7	2	9
	N	0	0	1	1	5	1	8
								123
#9	A	1	0	0	0	1	0	2
	B	0	1	2	0	2	1	6
	C	0	0	0	0	1	0	1
	D	0	0	1	1	6	10	18
	E	1	0	0	1	1	1	4
	F	0	2	2	2	10	7	23
	G	1	0	3	0	4	5	13
	H	0	1	0	0	0	2	3
	I	0	0	0	1	0	1	2
	J	1	0	1	0	2	3	7
	K	1	0	1	0	6	2	10
	L	1	1	1	1	10	10	24
	M	0	1	0	1	4	1	7
	N	1	0	0	0	1	2	4
								124

Option:		GCA	GCM	GEM	GIR	GLM	GSM	TOTAL
#10	A	0	0	0	0	0	2	2
	B	1	0	1	0	2	2	6
	C	0	0	0	0	1	2	3
	D	2	1	1	2	2	4	12
	E	0	0	0	0	3	0	3
	F	0	0	3	0	6	9	18
	G	1	0	1	0	8	6	16
	H	0	1	1	1	3	2	8
	I	2	2	0	0	4	2	10
	J	0	0	1	0	5	3	9
	K	1	1	0	2	1	3	8
	L	0	1	2	0	5	6	14
	M	0	0	0	2	4	3	9
	N	0	0	1	0	3	1	5
								123
#11	A	0	1	3	1	3	1	9
	B	1	0	2	1	4	2	10
	C	0	0	0	1	2	2	5
	D	2	0	2	0	4	1	9
	E	0	0	0	0	2	0	2
	F	1	2	1	1	2	3	10
	G	0	0	1	0	7	5	13
	H	0	0	0	0	3	2	5
	I	1	0	0	0	3	3	7
	J	0	0	1	1	8	4	14
	K	0	0	1	1	2	2	6
	L	1	0	0	1	3	10	15
	M	1	1	0	0	3	4	9
	N	0	2	0	0	2	6	10
								124
#12	A	0	0	1	1	5	1	8
	B	1	1	0	0	3	3	8
	C	1	1	1	1	5	5	14
	D	3	3	6	2	19	18	51
	E	2	2	3	3	16	18	44
								125
#13	A	0	0	0	0	1	0	1
	B	1	0	0	1	6	4	12
	C	0	0	2	0	2	1	5
	D	4	5	5	2	20	23	59
	E	2	2	4	4	19	17	48
								125

Option:		GCA	GCM	GEM	GIR	GLM	GSM	TOTAL
#14	A	0	0	0	0	3	0	3
	B	1	5	1	0	8	4	19
	C	0	0	2	0	5	3	10
	D	3	1	4	3	15	18	46
	E	3	1	4	2	17	20	47
								125
#15	A	0	0	0	0	0	1	1
	B	0	0	0	0	3	1	4
	C	0	2	2	1	3	7	15
	D	4	3	8	2	24	20	61
	E	3	2	1	4	18	16	44
								125
#16	A	0	0	0	0	0	1	1
	B	0	0	0	0	0	3	3
	C	2	2	1	0	1	5	11
	D	4	2	5	6	14	10	41
	E	1	3	5	1	33	26	69
								125
#17	A	2	0	1	1	8	6	18
	B	4	4	4	2	11	17	42
	C	1	0	5	3	14	13	36
	D	0	2	1	0	11	8	22
	E	0	1	0	1	4	1	7
								125
#18	A	0	0	1	0	5	0	6
	B	0	3	2	1	5	16	27
	C	0	1	4	3	8	11	27
	D	6	0	4	2	22	15	49
	E	1	3	0	1	8	3	16
								125
#19	A	6	4	8	4	27	21	70
	B	1	2	3	3	16	22	47
	C	0	1	0	0	4	2	7
	D	0	0	0	0	0	0	0
	E	0	0	0	0	1	0	1
								125

Option:		GCA	GCM	GEM	GIR	GLM	GSM	TOTAL
#20	A	0	0	0	0	2	1	3
	B	0	0	0	0	1	2	3
	C	2	1	1	1	0	2	7
	D	4	4	6	3	24	24	65
	E	1	2	4	3	21	16	47
								125
#21	A	1	2	4	1	9	15	32
	B	2	3	4	1	17	16	43
	C	2	1	2	3	10	9	27
	D	2	1	1	2	12	4	22
	E	0	0	0	0	0	1	1
								125
#22	A	0	0	0	0	2	0	2
	B	0	0	1	1	4	3	9
	C	1	1	2	1	6	6	17
	D	5	3	3	2	22	18	53
	E	1	3	5	3	14	18	44
								125
#23	A	7	6	9	6	41	31	100
	B	0	1	1	1	6	9	18
	C	0	0	1	0	0	2	3
	D	0	0	0	0	0	2	2
	E	0	0	0	0	1	1	2
								125
#24	A	1	0	1	1	2	0	5
	B	0	0	1	0	1	4	6
	C	0	0	1	0	4	3	8
	D	4	4	5	4	18	18	53
	E	2	3	3	2	22	20	52
								124
#25	A	0	0	0	0	2	1	3
	B	0	4	2	1	5	4	16
	C	0	0	1	1	2	9	13
	D	6	3	7	2	28	22	68
	E	1	0	1	3	11	9	25
								125

Option:		GCA	GCM	GEM	GIR	GLM	GSM	TOTAL
#26	A	1	1	1	0	0	9	12
	B	1	2	3	2	19	11	38
	C	3	1	0	2	10	12	28
	D	1	3	7	3	17	12	43
	E	1	0	0	0	2	1	4
								125
#27	A	0	0	0	0	0	0	0
	B	0	1	0	1	5	2	9
	C	2	1	2	1	14	3	23
	D	4	3	6	3	22	23	61
	E	1	2	3	2	7	17	32
								125
#28	A	0	0	0	0	0	0	0
	B	0	0	0	0	3	1	4
	C	4	2	4	3	17	14	44
	D	3	5	6	3	25	21	63
	E	0	0	1	1	3	9	14
								125
#29	A	1	0	0	1	6	2	10
	B	3	3	5	2	24	16	53
	C	3	3	4	2	13	16	41
	D	0	1	1	2	5	10	19
	E	0	0	1	0	0	1	2
								125
#30	A	0	0	0	0	1	0	1
	B	0	0	0	0	1	0	1
	C	1	0	2	1	10	6	20
	D	5	6	5	4	31	23	74
	E	1	1	4	2	5	16	29
								125
#31	A	0	0	0	1	0	0	1
	B	1	1	2	0	5	5	14
	C	4	1	1	1	9	10	26
	D	1	4	5	3	29	19	61
	E	1	1	3	2	5	11	23
								125

Option:		GCA	GCM	GEM	GIR	GLM	GSM	TOTAL
#32	A	4	0	0	1	2	5	12
	B	2	3	4	1	23	14	47
	C	1	4	4	3	17	16	45
	D	0	0	2	2	6	9	19
	E	0	0	1	0	0	1	2
								125
#33	A	5	5	6	3	27	24	70
	B	2	1	3	3	16	17	42
	C	0	1	2	0	3	3	9
	D	0	0	0	1	2	1	4
	E	0	0	0	0	0	0	0
								125
#34	A	0	0	0	0	0	0	0
	B	1	0	0	0	8	1	10
	C	3	2	3	4	13	15	40
	D	3	5	7	2	23	21	61
	E	0	0	1	1	4	8	14
								125
#35	A	0	0	0	0	0	0	0
	B	0	0	0	0	0	0	0
	C	2	0	2	1	12	10	27
	D	4	5	6	4	30	23	72
	E	1	2	3	2	6	12	26
								125
#36	A	0	0	0	0	1	0	1
	B	0	2	2	0	4	1	9
	C	2	0	2	4	15	11	34
	D	4	3	3	2	22	25	59
	E	1	2	4	1	6	8	22
								125
#37	A	0	0	3	0	2	11	16
	B	2	2	2	0	14	17	37
	C	3	4	4	2	16	8	37
	D	2	1	2	3	10	7	25
	E	0	0	0	2	5	2	9
								124

Option:		GCA	GCM	GEM	GIR	GLM	GSM	TOTAL
#38	A	0	3	2	3	17	7	32
	B	5	3	6	2	17	19	52
	C	2	1	3	0	11	10	27
	D	0	0	0	1	1	8	10
	E	0	0	0	1	2	1	4
								125
#39	A	6	5	9	4	5	1	30
	B	1	2	1	0	13	23	40
	C	0	0	1	2	21	13	37
	D	0	0	0	1	9	6	16
	E	0	0	0	0	0	2	2
								125
#40	A	1	1	0	0	1	0	3
	B	2	2	4	0	14	11	33
	C	4	4	5	3	23	17	56
	D	0	0	1	3	10	14	28
	E	0	0	1	1	0	3	5
								125
#41	A	0	0	0	0	1	0	1
	B	2	0	0	0	9	3	14
	C	5	3	6	2	15	15	46
	D	0	4	4	4	22	20	54
	E	0	0	1	1	1	7	10
								125
#42	A	1	3	3	1	12	4	24
	B	3	1	3	3	17	11	38
	C	3	2	1	1	10	15	32
	D	0	1	3	2	9	13	28
	E	0	0	1	0	0	2	3
								125
#43	A	1	2	2	1	10	5	21
	B	3	0	1	2	11	8	25
	C	2	3	4	2	16	14	41
	D	1	2	3	2	11	15	34
	E	0	0	1	0	0	3	4
								125

Option:		GCA	GCM	GEM	GIR	GLM	GSM	TOTAL
#44	A	1	1	2	1	9	7	21
	B	4	3	4	1	23	17	52
	C	2	2	3	4	12	16	39
	D	0	1	2	1	4	2	10
	E	0	0	0	0	0	2	2
								125
#45	A	1	1	1	0	6	6	15
	B	3	2	4	2	16	16	43
	C	1	3	3	3	15	14	39
	D	2	1	3	2	11	7	26
	E	0	0	0	0	0	2	2
								125
#46	A	0	0	0	0	1	0	1
	B	0	0	0	0	0	2	2
	C	0	1	1	0	2	3	7
	D	5	2	3	4	12	15	41
	E	2	4	7	3	33	25	74
								125
#47	A	0	0	0	0	5	1	6
	B	2	2	2	0	10	9	25
	C	2	3	8	4	16	7	40
	D	3	1	1	3	15	21	44
	E	0	1	0	0	2	7	10
								125
#48	A	0	0	0	0	1	1	2
	B	1	0	1	0	1	0	3
	C	1	0	4	1	3	0	13
	D	2	3	1	3	19	23	51
	E	3	4	5	3	24	17	56
								125

Option:		GCA	GCM	GEM	GIR	GLM	GSM	TOTAL
#49	A	0	1	0	0	1	2	4
	B	0	0	0	0	2	1	3
	C	3	1	3	1	12	6	26
	D	2	2	4	4	19	22	53
	E	2	3	4	2	13	14	38
								124
#50	A	0	0	0	0	1	3	4
	B	2	2	3	1	15	4	27
	C	1	3	5	4	16	14	43
	D	3	1	2	1	14	19	40
	E	1	1	1	1	2	5	11
								125
#51	A	7	4	8	3	26	21	69
	B	0	3	1	2	12	12	30
	C	0	0	2	1	7	7	17
	D	0	0	0	1	2	4	7
	E	0	0	0	0	1	1	2
								125
#52	A	0	0	0	0	0	1	1
	B	1	0	0	0	4	1	6
	C	2	1	2	2	10	4	21
	D	3	3	3	2	14	25	50
	E	1	3	6	3	20	14	47
								125
#53	A	1	0	0	0	0	1	2
	B	0	0	0	0	0	0	0
	C	0	0	0	0	0	0	0
	D	1	3	0	1	10	11	26
	E	5	4	11	6	38	33	97
								125

Option:		GCA	GCM	GEM	GIR	GLM	GSM	TOTAL
#54	A	0	0	0	0	1	1	2
	B	1	3	2	1	2	1	10
	C	2	1	1	2	5	3	14
	D	2	2	3	3	21	17	48
	E	2	1	5	1	19	23	51
								125
#55	A	2	1	3	0	3	11	20
	B	1	3	4	0	10	18	36
	C	1	1	2	1	12	7	24
	D	2	1	2	3	12	8	28
	E	1	1	0	3	11	1	51
								125
#56	A	3	4	5	4	18	21	56
	B	3	3	3	0	16	15	40
	C	1	0	1	3	9	7	21
	D	0	0	1	0	4	1	6
	E	0	0	0	0	1	1	2
								125
#57	A	5	4	6	3	4	5	56
	B	2	3	4	1	11	10	40
	C	0	0	1	1	20	10	21
	D	0	0	0	2	11	16	6
	E	0	0	0	0	2	4	2
								125
#58	A	1	2	1	1	1	1	7
	B	3	2	2	2	12	3	24
	C	1	1	4	1	23	12	42
	D	0	2	1	3	7	18	31
	E	2	0	3	0	5	11	21
								125

Option:		GCA	GCM	GEM	GIR	GLM	GSM	TOTAL
#59	A	1	0	0	1	1	1	4
	B	3	1	3	0	8	4	19
	C	3	3	3	2	23	5	39
	D	0	2	2	3	10	18	35
	E	0	1	3	1	6	17	28
								125
#60	A	2	3	0	1	9	2	17
	B	2	2	5	1	13	9	32
	C	2	0	2	3	18	13	38
	D	1	1	2	1	8	15	28
	E	0	1	2	1	0	6	10
								125
#61	A	1	2	2	1	9	3	18
	B	1	0	0	0	10	2	13
	C	0	4	3	5	14	12	38
	D	3	1	2	0	10	18	34
	E	2	0	4	1	5	10	22
								125
#62	A	2	3	1	1	7	5	19
	B	2	3	5	2	23	12	47
	C	1	1	3	3	10	16	34
	D	1	0	2	1	6	10	20
	E	1	0	0	0	2	1	4
								124
#63	A	2	3	1	4	11	17	38
	B	3	3	5	0	20	10	41
	C	2	1	3	2	11	12	31
	D	0	0	2	1	5	3	11
	E	0	0	0	0	1	2	3
								124

Option:		GCA	GCM	GEM	GIR	GLM	GSM	TOTAL
#64	A	1	0	1	0	5	0	7
	B	3	1	1	1	10	10	26
	C	0	1	5	3	12	11	32
	D	2	3	3	3	15	17	43
	E	1	2	1	0	6	7	17
								125
#65	A	0	2	2	2	6	6	18
	B	4	3	7	2	22	21	59
	C	2	1	1	1	11	12	28
	D	1	0	1	1	6	5	14
	E	0	1	0	1	3	1	6
								125
#66	A	0	1	0	0	4	1	6
	B	0	1	0	2	7	10	20
	C	3	2	3	3	14	13	38
	D	4	2	6	2	18	20	52
	E	0	1	2	0	5	1	9
								125
#67	A	0	0	1	1	6	2	10
	B	0	1	4	1	13	10	29
	C	3	4	6	2	15	18	48
	D	3	2	0	2	10	12	29
	E	1	0	0	1	4	3	9
								125
#68	A	0	0	0	0	1	0	1
	B	0	0	0	0	1	0	1
	C	0	1	0	0	0	4	5
	D	4	5	9	2	29	27	76
	E	3	1	2	5	17	14	42
								125

Option:		GCA	GCM	CEM	GIR	GLM	GSM	TOTAL
#69	A	0	0	0	1	3	1	5
	B	2	0	1	0	6	4	13
	C	0	2	4	1	8	17	32
	D	3	3	4	3	26	18	57
	E	2	2	2	2	5	5	18
								125
#70	A	1	0	0	1	3	0	5
	B	5	2	3	1	11	15	37
	C	0	3	2	5	16	15	41
	D	0	2	4	0	17	14	37
	E	1	0	2	0	0	1	4
								124
#71	A	5	2	8	4	20	23	62
	B	2	5	3	2	19	13	44
	C	0	0	0	0	4	6	10
	D	0	0	0	1	1	2	4
	E	0	0	0	0	3	1	4
								124

Appendix D: Knowledge and Importance Score Calculations and Comparisons

This appendix provides the computations used to calculate Class 89S/D knowledge/importance scores for survey Part IV and Part V. Points were calculated from responses as follows, A=0, B=1, C=2, D=3, E=4. If all 125 respondents were to answer with an "E", that would result in a "perfect" score of 500 (125x4).

Part I of this appendix is the point calculations and Part II contains the graphs comparing knowledge and importance scores for each program option.

Part I

Questions 28-45, Computer Term Knowledge Point Calculation

Q#	GCA	GCM	GEM	GIR	GLM	GSM	TOTAL
28	17	19	30	19	124	128	337
29	9	12	20	12	65	82	200
30	21	22	35	22	134	145	379
31	16	19	31	19	130	126	341
32	4	11	22	13	75	77	202
33	2	3	7	6	28	26	72
34	16	19	31	18	119	126	329
35	20	23	34	22	138	137	374
36	20	19	31	18	124	130	342
37	14	13	16	21	96	62	222
38	9	5	12	9	50	67	152
39	1	2	3	7	82	75	170
40	10	10	21	19	90	99	249
41	12	18	28	20	109	121	308
42	9	8	18	11	64	88	198
43	10	12	28	12	76	93	231
44	8	10	16	12	59	63	168
45	11	11	19	14	79	73	207

Questions 46-63, Computer Term Importance Point Calculations

Q#	GCA	GCM	GEM	GIR	GLM	GSM	TOTAL
46	23	24	39	24	172	153	435
47	15	15	21	17	95	114	277
48	21	25	32	23	160	145	406
49	20	20	34	22	135	135	366
50	17	15	23	16	97	109	277
51	0	3	5	7	36	42	93
52	18	23	37	22	146	140	386
53	23	25	44	27	182	165	466
54	19	15	33	18	151	150	386
55	13	12	14	23	114	60	236
56	5	3	8	6	50	36	108
57	2	3	6	9	92	94	206
58	13	10	25	13	99	125	285
59	9	17	27	17	108	136	314
60	9	9	23	14	73	104	232
61	18	11	28	14	88	120	279
62	11	5	17	11	69	78	191
63	7	5	17	7	61	51	148

Part II

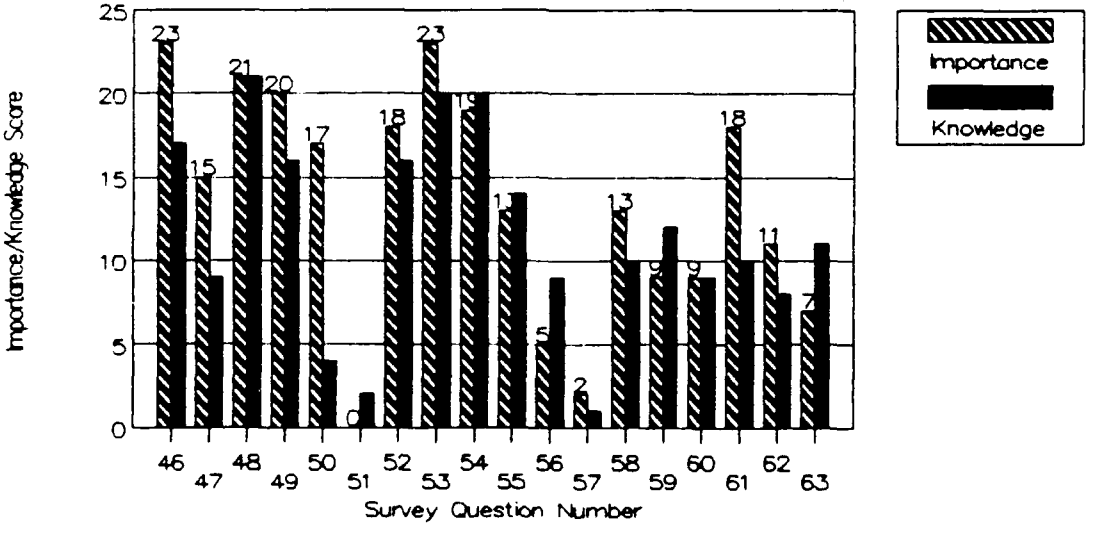

Figure 5: GCA Importance/Knowledge Score Comparison

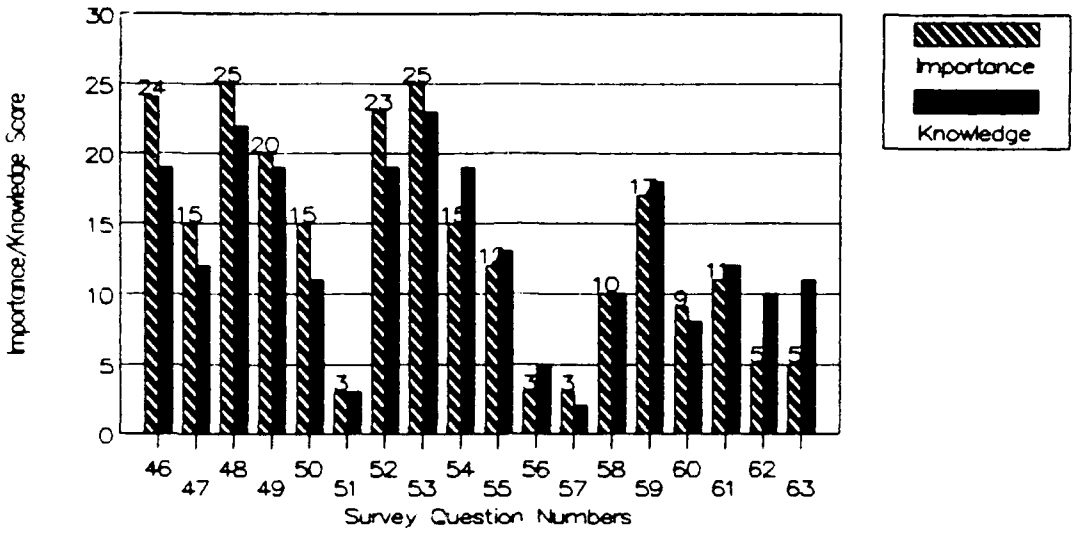

Figure 6: GCM Importance/Knowledge Score Comparison

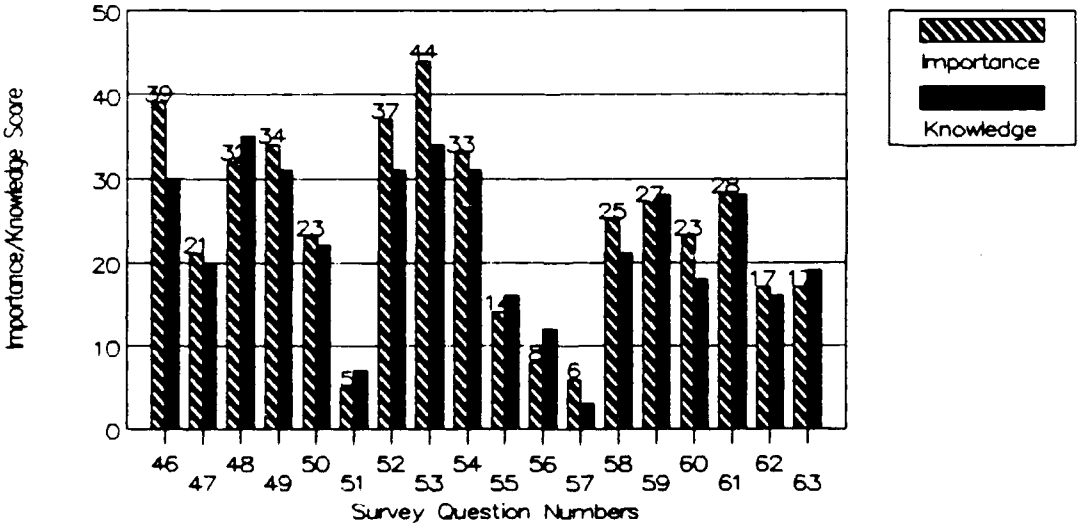

Figure 7: GEM Importance/Knowledge Score Comparison

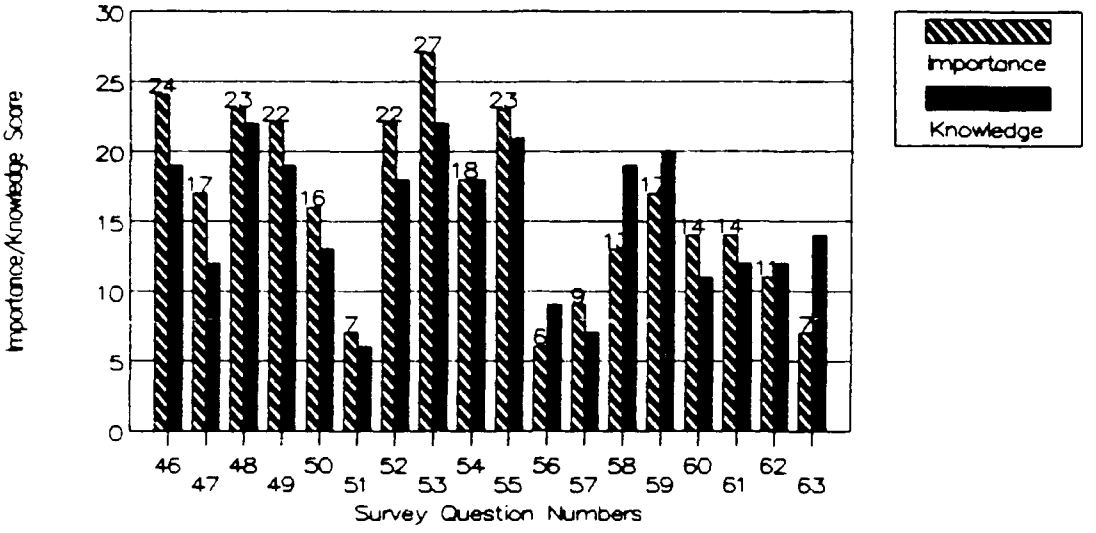

Figure 8: GIR Importance/Knowledge Score Comparison

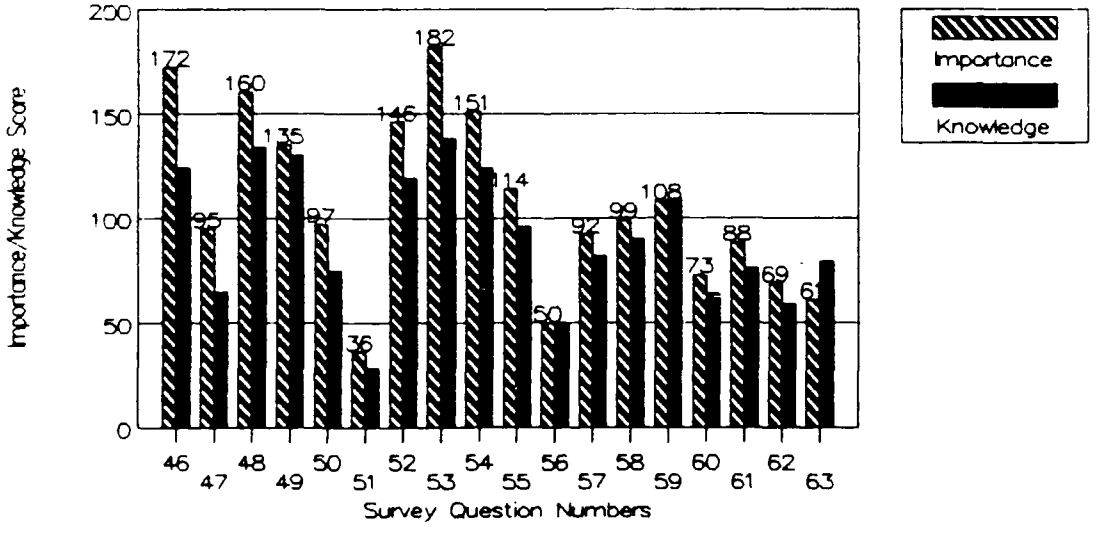

Figure 9: GLM Importance/Knowledge Score Comparison

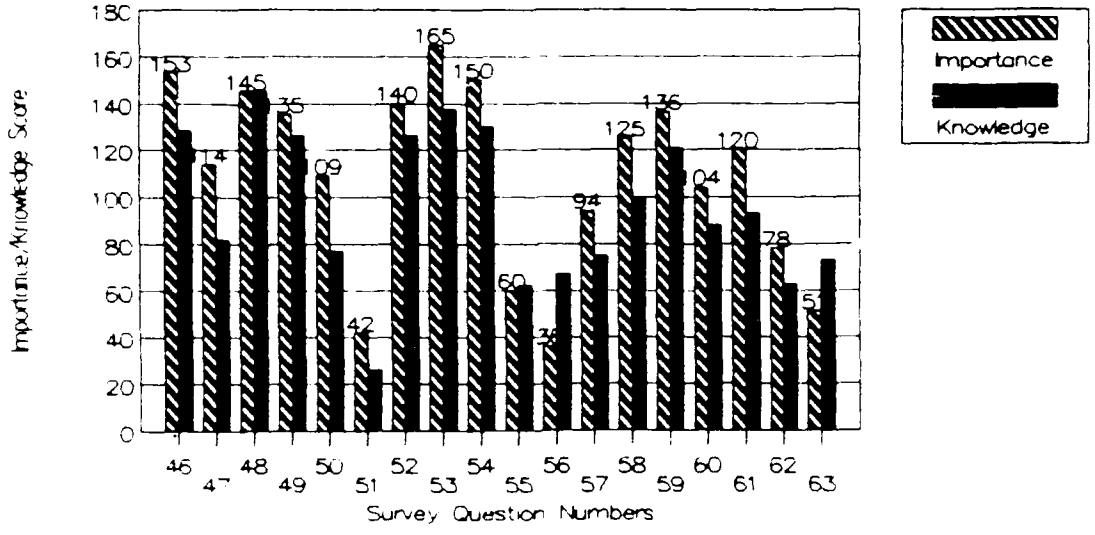

Figure 10: GSM Importance/Knowledge Score Comparison

Appendix E: Program Option Descriptions

AFIT graduate students in the School of Systems and Logistics are grouped into one of six graduate programs known as "program options" within the school. One of the programs, the Graduate Logistics Management (GLM) Program, is comprised of five program majors. In this research, these program majors, Acquisition Management, Inventory Management, Logistics Management, Maintenance Management, and Transportation Management have not been broken out but have been considered under the GLM program option together. AFIT Class 89S/D did not have any students majoring in Maintenance Management so that major is not represented in the GLM research data.

A brief description of each program option, taken directly from the 1989S/D Graduate Programs Handbook, follows. Each program is fully-accredited and leads to award of the Master or Science Degree (1:2-3).

Graduate Engineering Management (GEM)

This program provides civil engineering graduate students with a 15-month curriculum leading to the Master of Science in Engineering Management. (Civil engineering officers without an accredited undergraduate engineering degree are awarded a Master of Science in Technical Management). The program is designed to provide students having a technical undergraduate academic background with a graduate educational program designed to improve their effectiveness in managing civil engineering organizations and activities.

Graduate Logistics Management (GLM)

This program provides students from a variety of logistics career fields with a 15-month curriculum leading to a Master of Science degree in Logistics Management. This graduate educational program is designed to provide military and civilian managers with the knowledge and analytical skills necessary to effectively manage both the logistics functional areas and the logistics system as a whole. The degree is offered with majors in:

(1) Logistics Management
(2) Maintenance Management
(3) Transportation Management
(4) Supply Management
(5) Acquisition Logistics Management

Graduate Systems Management (GSM)

This program presents a 15-month curriculum to students from various systems research, development, engineering, and cost analysis career fields. The program has been developed to provide students with a graduate education designed to

improve their effectiveness in managing programs for which they are responsible.

Graduate Information Resources Management (GIR)

This program consists of an 18-month interdisciplinary curriculum which educates students in the analysis, design, development and implementation of information systems in complex organizations. The graduates of this program are expected to interact with both organizational functions and computer technology and to effectively manage organizational information resources to facilitate performance.

Graduate Cost Analysis (GCA)

This program consists of a 15-month curriculum which leads to a Master of Science degree in Cost Analysis. Graduates are expected to be able to analyze complex and dynamic cost problems, operate within diverse environments, and make informed decisions.

Graduate Contracting Management (GCM)

This program offers graduate students a 15-month curriculum leading to the Master of Science degree in Contracting Management. The program is designed to provide students with a theoretical background, analytical tools, and knowledge of current issues necessary to manage in the weapon systems acquisition arena in general and the systems contracting career field in particular.

Appendix F: Recommendations for Future Research

1. Before this research is repeated, the survey instrument should be improved. Several areas that this researcher believes merit improvement are listed at the end of this appendix. Several of the survey problem areas were pointed out by students' comments in the essay portion of the survey.

2. AFIT/LSG can provide information on the composition of the class, specific names and program options each student is assigned to.

3. Select an opportune time to survey the class. The class should be far enough along in their AFIT programs to fully understand the computer requirements of their program option. How far into the program a researcher should wait can be judged by discussing your research goal with each program option manager and asking their opinion. Another factor to consider about survey timing is that response rates will be lower during busy academic times such as finals week. Try to avoid surveying students when their schedule is especially busy. The electronic mail system is an effective way to prompt students to respond to the survey, and to make yourself available to any questions they may have.

4. Computer code sheets are available from AFIT/LSG. The researcher should review the sheets available and be sure to pick one that has a numbering scheme that matches the survey response options. Once coded sheets are returned, the Logistics school computer center can scan the sheets and provide you with results. If the researcher wants to avoid any manual calculating of percentages he/she can use programs such as the SAS programs discussed in Captain Richard Lenz' thesis (15:125).

5. Good luck on your research!

Survey Modification Recommendations

Part I: Some of the students in program majors that make up the GLM program option did not recognize this when asked to mark their program for question 1. Add an explanation to question 1 that these majors fall in the GLM category.

Part II: The instruction preference questions (2-11) were somewhat confusing to respondents. The "most enjoyable/least enjoyable" question format was tedious and did not emphasize that the respondent should think in terms of computer instruction preference. Reduce the amount of choices a respondent must make (ie: have them pick their three favorite techniques only) and add some questions asking specifically what techniques are preferred when learning computers. There may or may not be a difference in preferences between preferred style for general learning and the style preferred to learn computers.

Parts IV and V:

Emphasize that you want respondents to answer with their CURRENT knowledge and importance opinions. Some students thought the survey wanted pre-AFIT opinions. This confusion probably resulted because Class 89S/D had received Captain Lenz' survey about pre-AFIT computer knowledge. Further clarify the intent of this survey can not hurt.

The general nature of the terms/concepts in these sections restricts the value of these questions to anyone trying to pin point exact computer skills instead of general skill areas. If research is intended to produce specific skills to teach, make questions 28-63 more specific.

Cover Letter:

The survey was pre-tested to take between 10-18 minutes, however, several students claimed it took them up to 45 minutes to accomplish. Whether or not it took that long, future research should remove the statement on their cover letter claiming the survey only takes 10-15 minutes. This will take away any suspicions that the letter was intentionally misleading to encourage responses.

Bibliography

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The purpose of this research was to determine the perceived computer literacy and computer training needs of AFIT Graduate Class 89S/D. A survey was conducted to answer three research questions: (1) Do AFIT graduate students have academic requirements that require computer literacy? If so, how important is having adequate computer skills to student academic assignments? (2) What computer skills are most important for AFIT graduate academic requirements? How knowledgeable do students consider themselves to be in these computer skills? (3) Does AFIT's current level of computer training provide graduate students with sufficient skills to meet academic requirements?

The research found that AFIT graduate students do have academic requriements for computer literacy and that students consider couputer knowledge to be signifigantly important to their academic success at AFIT. A ranking of computer skills by students placed microcomputer skills, word processing and electronic spreadsheet use ahead of mainframe computer uses. In 89 percent of the computer skills researched students perceived they had lower knowledge in the skill area than they placed importance in that area. Specific areas where knowledge levels were low were pinpointed as potential training problem areas. Though only a small percentage of respondents felt unable to complete academic assignments due to training deficiencies, a majority of respondents felt better computer training would enhance their academic efficiency. Students responded that they preferred hands-on, highly supervised training sessions.

This study recommended AFIT re-evaluate its training methods and the content of its computer courses based upon the learning styles and ranking of important computer skills compiled in this research. A recommendation was made to continue surveying AFIT classes to monitor any changes in computer training needs and to possibly provide even more precise information on computer skills required of AFIT graduate students.